



schools online curriculum content initiative

LEARNING OBJECTS **Catalogue**



APRIL 2007

Contents

Science learning objects	1
Earth and beyond	2
Soil (Years P–2)	2
Water (Years P–2)	4
Weather (Years P–2)	5
Day and night (Years P–2)	6
Under the earth (Years P–2)	7
Water use (Years P–2)	8
Land use (Years P–2)	9
Light and shadows (Years P–2)	10
Earth rotation (Years 7–8)	11
Shaping the land (Years 5–10)	15
Travel back in time (Years 7–9)	16
The colour of water (Years 7–10)	17
Exploring for resources* (Years 9–10)	19
Tectonic boundaries* (Years 9–10)	20
Tectonics investigator* (Years 7–10)	22
Content from other sources	24
Down to Earth (Years 5–9)	24
Exploring Earth's structure (Years 5–9)	26
Get into geology (Years 5–12)	27
Following the Moon (Years 5–9)	28
The wonders of our universe (Years 5–9)	29
The secret of Itsall Mine (Years 9–12)	30
Life and living	31
Garden detective (Years P–2)	31
Food chains (Years P–2)	33
Animal search (Years 1–2)	35
Human body (Years 3–4)	37
Plant life (Years 3–4)	38
Surviving in a habitat (Years 3–4)	39
Human impact (Years 3–4)	40
Frog pond habitat (Years 3–9)	42
Create a creature (Years 5–6)	43
Eyeball challenge (Years 5–8)	45
Bacteria zoo (Years 5–8)	46
Content from other sources	47
Body parts (Years 5–7)	47
Aches and pains (Years 5–7)	48
Rainforest life (Years 5–8)	49
Microscopes (Years 5–8)	50
Life cycles (Years P–4)	51
Animal groups (Years P–4)	52
The place that's right for me (Years P–4)	53
Feral peril (Years 5–8)	54
Ecosystem balance (Years 5–10)	55
Natural and processed materials	56
Kitchen chemistry (Years 3–4)	56
Mystery substance (Years 3–6)	58
Chemical science (Years 5–6)	60
Plastics (Years 7–8)	62
The elements (Years 7–8)	63
Types of matter* (years 7–8)	65
pH* (Years 7–9)	67
Chemical reactions (Years 9–10)	69

Sunscreens (Years 9–10)	71
UV index (Years 9–10)	72
Content from other sources	73
Making water drinkable (Years 5–9)	73
What the world is made of (Years 5–9)	74
Energy and change	75
Let's make it go (Years P–1)	75
Mixing colours (Years P–2)	77
Pushing and pulling (Years P–3)	78
Energy from the Sun (Years 3–5)	79
Sound (Years 3–6)	80
Sound: thunderstorm (Years 3–6)	82
Steady ships (Years 3–6)	83
Jet force (Years 4–6)	85
Energy-efficient house (Years 4–6)	86
Matter and evaporation (Years 5–6)	88
Making music (Years 5–6)	89
Optics and images (Years 5–6)	91
Light and reflection (Years 5–6)	93
Pulleys (Years 5–8)	95
Additive colour (Years 5–8)	96
Subtractive colour (Years 5–8)	97
Air pressure (Years 5–8)	98
Sport shoes (Years 6–7)	100
Wild ride (Years 6–7)	101
Accelerate (Years 7–10)	103
Optics and prisms (Years 8–10)	104
Glide (Years 9–10)	106
Isotopes and radiation (Years 9–10)	107
Nuclear power (Years 9–10)	108
Wind power (Years 9–10)	109
Speed and direction (Years 9–10)	110
Speed and distance (Years 9–10)	111
Vision and lenses (Years 9–10)	112
Seeing with sound (Years 9–10)	113
Optics and refraction (Years 9–10)	115
Exploring atoms (Years 9–10)	116
Resistors (Years 9–10)	118
Logic gates (Years 9–10)	120
Capacitors (Years 9–10)	122
Wave Maker* (Years 9–10)	123
Content from other sources	125
Electrifying concert (Years 5–8)	125
Wiring (Years 5–12)	126
Lighting (Years 5–8)	127
Working scientifically	128
Kitchen stacker (Years 1–3)	128
Colossal fossils* (Years 5–6)	130
Fair test (Years 5–8)	131
Meet a scientist (Years 5–9)	132
Mystery disease* (Years 9–10)	134
Science reporter (Years 7–10)	135
Exploring atoms: atom structure (Years 9–10)	137
Content from other sources	138
Forensic science (Years 9–12)	138

Science learning objects

This catalogue contains details about the interactive digital learning objects for Science available from The Learning Federation (TLF). The content has either been produced by TLF or licensed from other sources and made available by TLF.

The Science learning objects support and enhance students' understanding of key scientific concepts in a range of contexts for the P–10 years.

Learning objects released to date cover the following curriculum strands:

- Earth and beyond
- Life and living
- Natural and processed materials
- Energy and change
- Working scientifically.

TLF produced content

The TLF Science content is based on current research findings in science education and pedagogy. They foster scientific inquiry, data interpretation, analysis and synthesis skills that are transferable to daily life and to offline learning opportunities.

The learning objects promote scientific literacy and are organised around scientific concepts with real-life application for students. They contain open-ended investigative tasks, tools, activities, and processes that enable students to engage in 'real' science experiences and to construct and test their own scientific understandings.


Many of the learning objects also provide meaningful models, simulations and demonstrations of scientific concepts and practices. These provide teachers and students with experiences that are not universally available because, for example, they require expensive equipment or occur over extended periods of time.

Content from other sources

TLF also licences Science content from other sources to include in the pool of digital resources available to all schools in Australia and New Zealand.

General information

Details of learning objects released to date are provided in addition to a key graphic representation. An asterisk (*) on the series title indicates that not all the learning objects in that series have been released. The remaining learning objects will be released progressively.

Many of the learning objects are aggregated into a sequence. Aggregated learning objects are identified with the symbol .

Content from other sources, as well as some learning objects produced by TLF, contain licensed copyright material (non-TLF content). See the Acknowledgements and Conditions of use in the learning objects for details.

Government and non-government education authorities in each Australian state and territory and in New Zealand have responsibility for facilitating access to the pool of learning objects. Contact TLF's Contact Liaison Officer (CLO) in your state, territory, school sector or country for details.

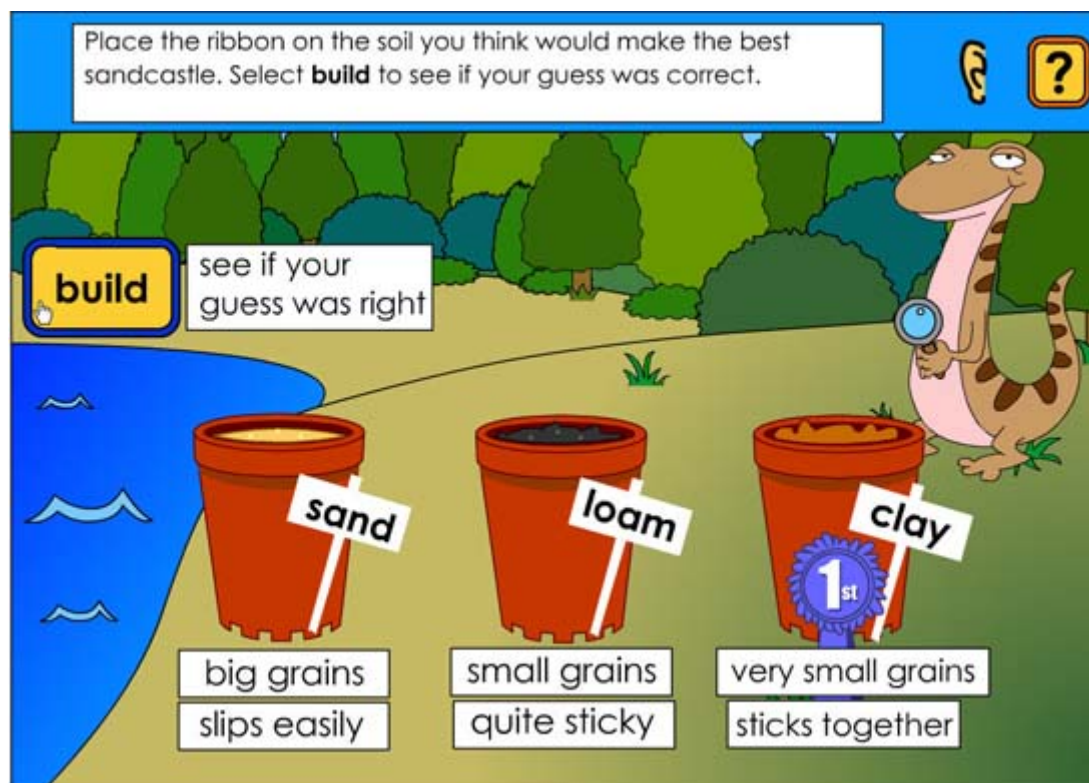
For further information about TLF, learning objects and CLO contact details, go to the website at www.thelearningfederation.edu.au.

Earth and beyond

Earth and beyond learning objects released to date are grouped into the series shown below.

Soil (Years P–2)

This Soil series enables students to explore the properties of natural soil environments and the interactions between the living and non-living components that contribute to healthy soil.



Learning objects	LO ID	Years
Explore soil [includes spoken instructions]	2	P–2
Explore soil	187	P–2
Create a soil environment [includes spoken instructions]	3	P–2
Create a soil environment	188	P–2
Soil types [includes spoken instructions]	4	P–2
Soils types	189	P–2
Soil [includes spoken instructions] 🧱	68	P–2
Soil 🧱	205	P–2

Explore soil

Students explore how soil is formed from rock particles and organic matter and how plants and animals interact with the soil.

Create a soil environment

Students grow flowers or vegetables in a garden bed and compare results in different environmental conditions when adding things such as water, organic matter, digging tools and earthworms.

Soils types

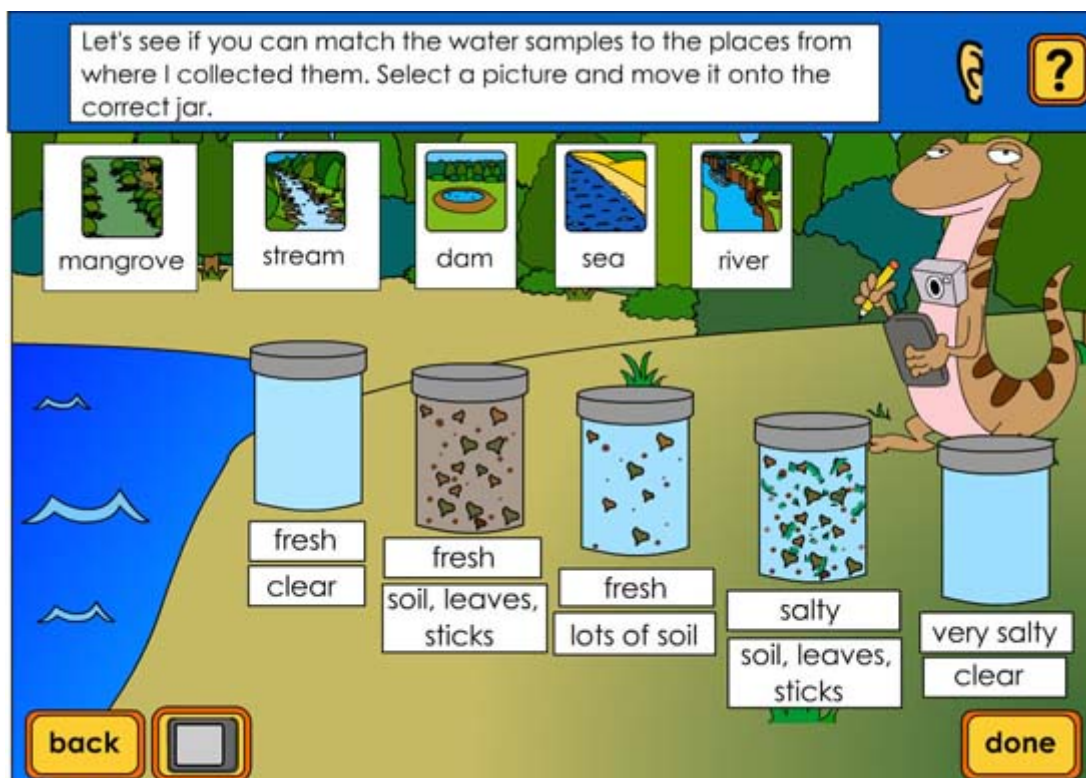
Students examine the properties of three different soil types: sand, loam and clay and explore the effects of compaction and water content on the soil.

Soil

‘Soil’ is an aggregated learning object combining the three other learning objects.

Water (Years P–2)

This Water series enables students to explore the quality of water in different aquatic habitats and to associate aquatic animals with their habitats according to water types..



Learning objects	LO ID	Years
River journey [includes spoken instructions]	5	P–2
River journey	190	P–2
Water types [includes spoken instructions]	6	P–2
Water types	191	P–2
Waterways [includes spoken instructions] 🧩	69	P–2
Waterways 🧩	206	P–2

River journey

Students move Frog down a river in a boat, stopping at four locations: a creek, a waterfall, a river mouth and a bay. Using equipment in the boat, Frog can check the water at each location for temperature, salinity, clarity and current speed. At the end of the journey, students meet four different animals and predict the habitats in which they live.

Water types

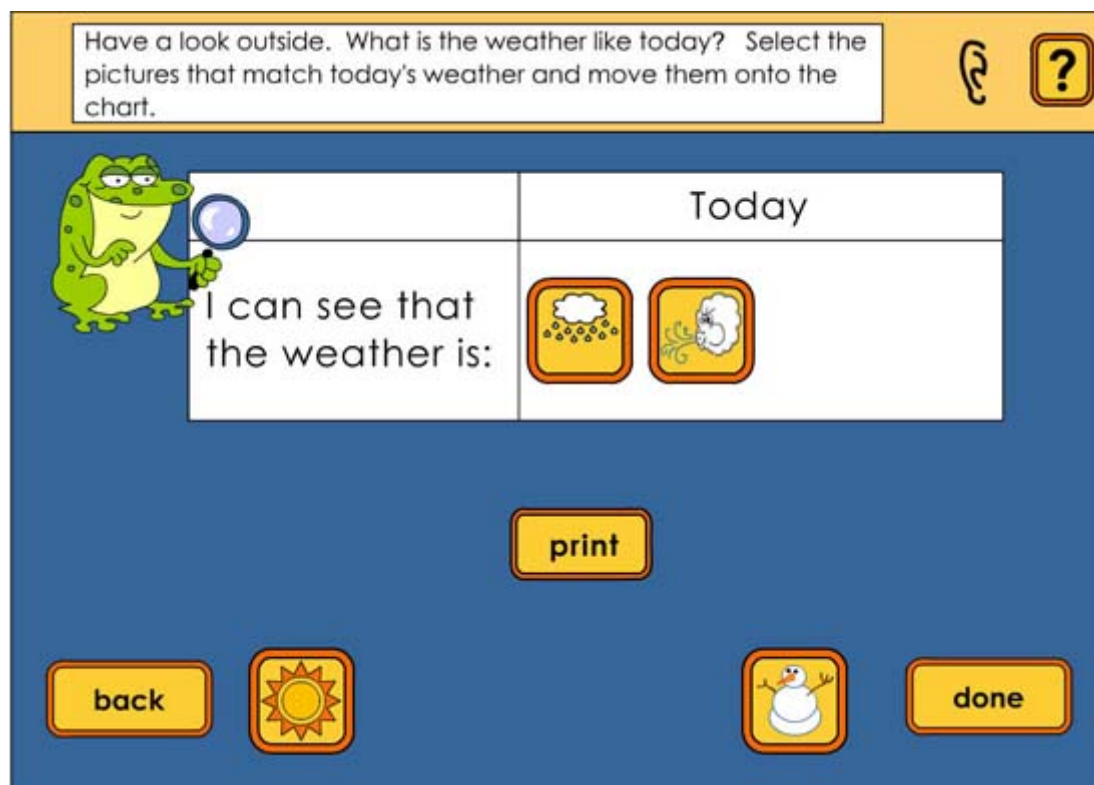
Students help Gecko test water samples for salinity levels and sediment content from five different aquatic habitats: a river, the sea, a mangrove estuary, a stream and a dam. Students compare the salinity and clarity of the water samples, matching them with their original habitats.

Waterways

This is an aggregated learning object combining the two other learning objects.

Weather (Years P–2)

The Weather series enables students to explore variations in weather and how the variations affect human behaviour.



Learning objects	LO ID	Years
Explore the weather [includes spoken instructions]	9	P–2
Explore the weather	193	P–2
Experience the weather [includes spoken instructions]	10	P–2
Experience the weather	194	P–2
Weather wear [includes spoken instructions]	11	P–2
Weather wear	195	P–2
Weather [includes spoken instructions] 🧩🧩	71	P–2
Weather 🧩🧩	207	P–2

'Experience the weather' and 'Weather' contain non-TLF content. See Acknowledgements in the learning objects.

Explore weather

Students help Frog explore elements related to particular types of weather.

Experience weather

Students explore the links between the climates of four locations: Antarctica, the Sahara desert, the New Zealand mountains, and the Amazon rainforest. Using a palette of choices, students select weather conditions typical of each location.

Weather wear

Set on a sailing boat, students hear and/or read weather forecasts. They then prepare Gecko and the boat for the weather ahead. Students can also determine the weather conditions and explore the results.

Weather

This is an aggregated learning object combining the three other learning objects.

Day and night (Years P–2)

In the Day and night series students observe the changing sky as day becomes night and then night turns into day again.



Learning objects	LO ID	Years
Day sky, night sky [includes spoken instructions]	20	P–2
Day sky, night sky	204	P–2

Students help Frog identify objects in the sky: the Moon, a star, a planet, the Sun, a cloud and a star group. Students then create their own sky scene using the elements supplied. The completed picture can be printed.

Under the earth (Years P–2)

This Under the earth series enables students to explore the structures, composition and life forms that exist in subterranean landscapes.



Learning objects	LO ID	Years
Caving [includes spoken instructions]	12	P–2
Caving	196	P–2
Volcanoes [includes spoken instructions]	13	P–2
Volcanoes	197	P–2
Mineshaft [includes spoken instructions]	14	P–2
Mineshaft	198	P–2
Under the earth [includes spoken instructions] 🧩	72	P–2
Under the earth 🧩	208	P–2

'Volcanoes', 'Mineshaft' and 'Under the earth' contain non-TLF content. See Acknowledgements in the learning objects.

Caving

Students guide Frog through a limestone cave as he stops at different points to examine, photograph or collect specimens. The activity concludes with a labelling exercise that can be printed.

Volcanoes

Students assist Gecko to direct a robot as it is lowered into a vent in order to examine the action of a volcano prior to eruption. The robot provides the opportunity for students to observe changes in temperature, soils and rocks.

Mineshaft

Students examine the links between the resources mined or found underground, and their uses above the ground.

Under the earth

This is an aggregated learning object combining the three other learning objects.

Water use (Years P–2)

The Water use series focuses on features of water in a built human environment.

Thanks for helping me with my investigations. Frogs can lay their eggs in any type of water but only some places are good for frog eggs to survive and grow in.

open drain

swimming pool

river mouth

rain puddle

My Frog Report

Today, I found that frogs can lay their eggs in

shallow creek

garden pond

_____ , _____ ,

wetland

dam

_____ and _____ .

back

print

restart

Learning objects	LO ID	Years
Where do frogs lay their eggs? [includes spoken instructions]	17	P–2
Where do frogs lay their eggs?	201	P–2
Explore water pipes [includes spoken instructions]	18	P–2
Explore water pipes	202	P–2
Where does tap water come from? [includes spoken instructions]	19	P–2
Where does tap water come from?	203	P–2
Water use [includes spoken instructions] 🧩	74	P–2
Water use 🧩	210	P–2

'Explore water pipes' and 'Water use' contain non-TLF content. See Acknowledgements in the learning objects.

Where do frogs lay their eggs?

Students examine different bodies of water, both permanent and temporary, that commonly exist in the built environment and consider their suitability as a place for a frog to lay its eggs. Students investigate the sites and record their findings in a printable 'Frog report'.

Explore water pipes

Students help Gecko to trace a city's water supply and disposal. They collect and test water samples from six locations: a dam, a water treatment plant, a pumping station, a house, a sewerage treatment plant and a creek outfall. They then compare the water clarity and purity, matching the samples with their original locations.

Where does tap water come from?

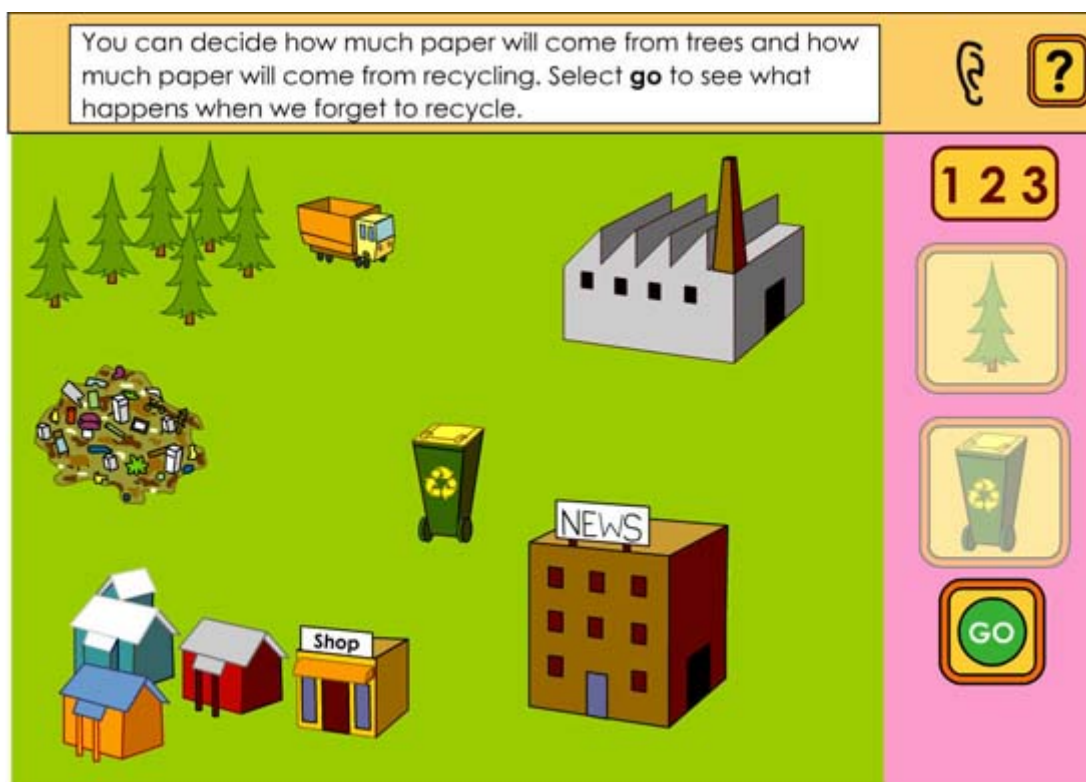
Students complete a click-and-drag jigsaw puzzle, which enables them to understand the water cycle from the perspective of a household user in the country or in a city.



Water use

This is an aggregated learning object combining the three other learning objects.

Land use (Years P–2)

The Land use series enables students to explore human impact on the environment.



Learning objects	LO ID	Years
News story [includes spoken instructions]	15	P–2
News story	199	P–2
New developments [includes spoken instructions]	16	P–2
New developments	200	P–2
Land use [includes spoken instructions] 	73	P–2
Land use 	209	P–2

News story

Students follow the production cycle of a newspaper from a forest plantation to a paper mill, to a printing press, to a newsagent, to its readers and finally to waste paper and recycling. They discover how recycling can reduce demand on natural resources.

New developments

Students explore the impact of built environments such as houses, roads and shopping centres on the natural environment. They help Gecko survey populations of mammals and birds, and explore the balance between development and wildlife conservation. Simulated environments include national parks, creeks, wetlands, bridges, towns and farms.

Land use

This is an aggregated learning object combining the two other learning objects.

Light and shadows (Years P–2)

The Light and shadows series enables students to explore the way shadows are created and the impact that different shapes can have on their shadows.



Learning objects	LO ID	Years
Light and shadows: casting shadows	1126	P–2
Light and shadows: matching shadows	1127	P–2
Light and shadows 🧩	756	P–2

Light and shadows: casting shadows

After an introduction that carefully explains the reasons why and how shadows are created, students examine the way different shapes can generate different shadows. With the ability to move the Sun, students can see the different shadows cast at different times of the day.

Light and shadows: matching shadows

To extend their understanding, students are asked to match either the shadow that is displayed on the screen to an object, or to make a shadow to match a given object. Students are then asked to move the Sun to the correct position in the sky to generate the shadow that is being displayed by a given object.

Light and shadows

This is an aggregated learning object combining the two other learning objects.

Earth rotation (Years 7–8)

The Earth rotation series focuses on the relationship between the Sun and the Earth, exploring the concepts of night and day, sunrise and sunset, and the apparent movement of stars.



Learning objects	LO ID	Years
Earth rotation: night and day	696	7–8
Earth rotation: sky watch	1128	7–8
Earth rotation: merry-go-round	1129	7–8
Earth rotation: stargazing	1130	7–8

Earth rotation: night and day

Using an animated model of the Earth, students explore how rotation is related to night and day, and time of day. Students investigate how the Sun shines on one side of the Earth while the other side is in darkness. They are challenged to answer a series of questions by experimenting with the model. For example, when the Sun rises in New Zealand, what is the approximate time in Sydney?

Earth rotation: sky watch

By interacting with the model, students are able to relate the changing position of the Sun, the Moon and stars in the sky to the rotation of the Earth. Students are challenged to answer a series of questions by experimenting with the model. For example: How much of the Earth is in shadow at any one moment?

Earth rotation: merry-go-round

By comparing views from a moving merry-go-round to views from stationary positions around the merry-go-round, students are introduced to the idea that apparent movement of objects may depend on the viewing frame of reference. Students then use the Earth rotation model to compare views from Earth to views of Earth from a stationary point in space.

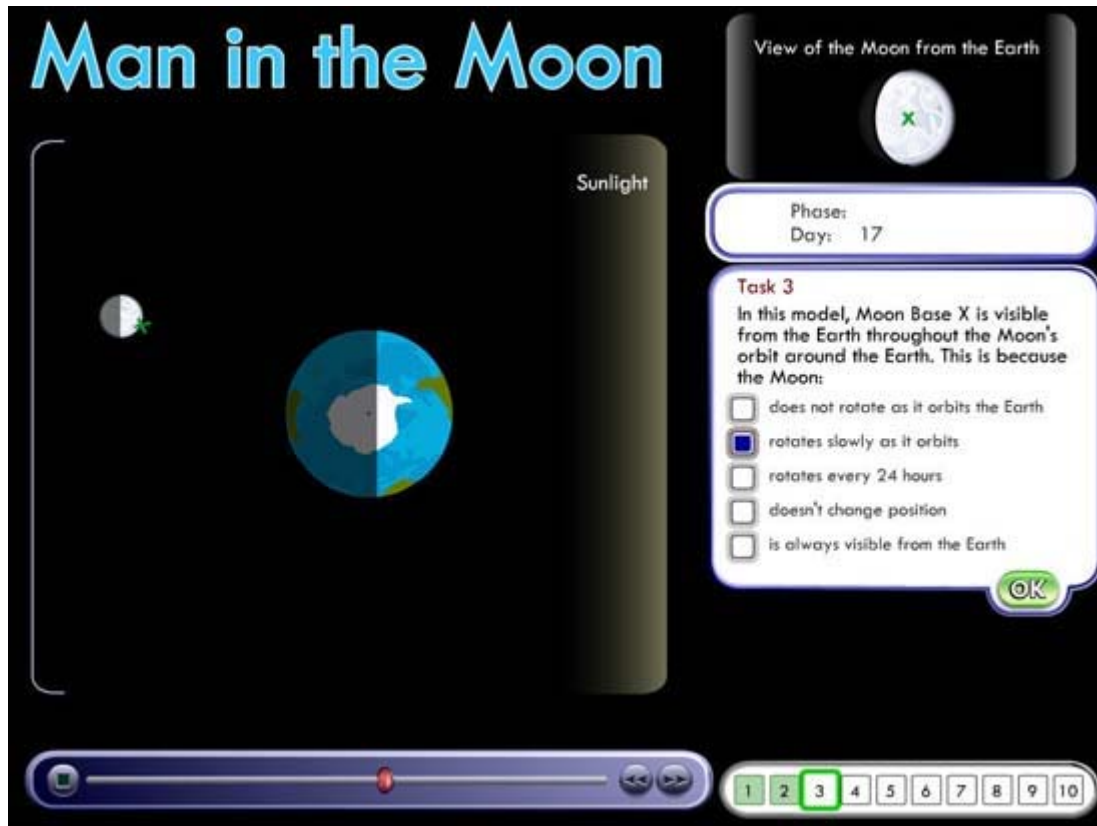
Earth rotation: stargazing

Students are able to take time-lapse photos of the night sky from different places on Earth and then observe the pattern of star movement. Students discover that in some locations the

stars appear to follow a straight line, while in others they appear to follow a curve, or even a circle.

Lunar cycles (Years 7–8)

The Lunar cycles series explores the relationship between the Sun, Earth and the Moon, including the concepts of Moon phases, Earth glow, and the 'dark' side of the Moon. Students investigate these concepts by interacting with an animated model of the Moon circling around the Earth. Understanding is tested with a quiz and random variation of questions supports repeated use.



Learning objects	LO ID	Years
Lunar cycles: Moon phases	754	6–8
Lunar cycles: moonrise	1131	6–8
Lunar cycles: man in the Moon	1132	7–8
Lunar cycles: Earth glow	1133	7–8

Lunar cycles: Moon phases

Students explore how rotation is related to views of the Moon. They discover that as the Sun shines on one side of the Moon the other side is in darkness. The students then answer a series of questions by experimenting with the model. For example: How long does it take for the Moon to make one complete orbit around the Earth?

Lunar cycles: moonrise

Students are able to relate the time the Moon rises and sets to its orbit around the Earth. The model allows the students to determine the visible shape of the Moon from its orbit position. The students then answer a series of questions by experimenting with the model. For example: What phase of the Moon is seen from Earth for the same length of time in the daytime and at night?

Lunar cycles: man in the Moon

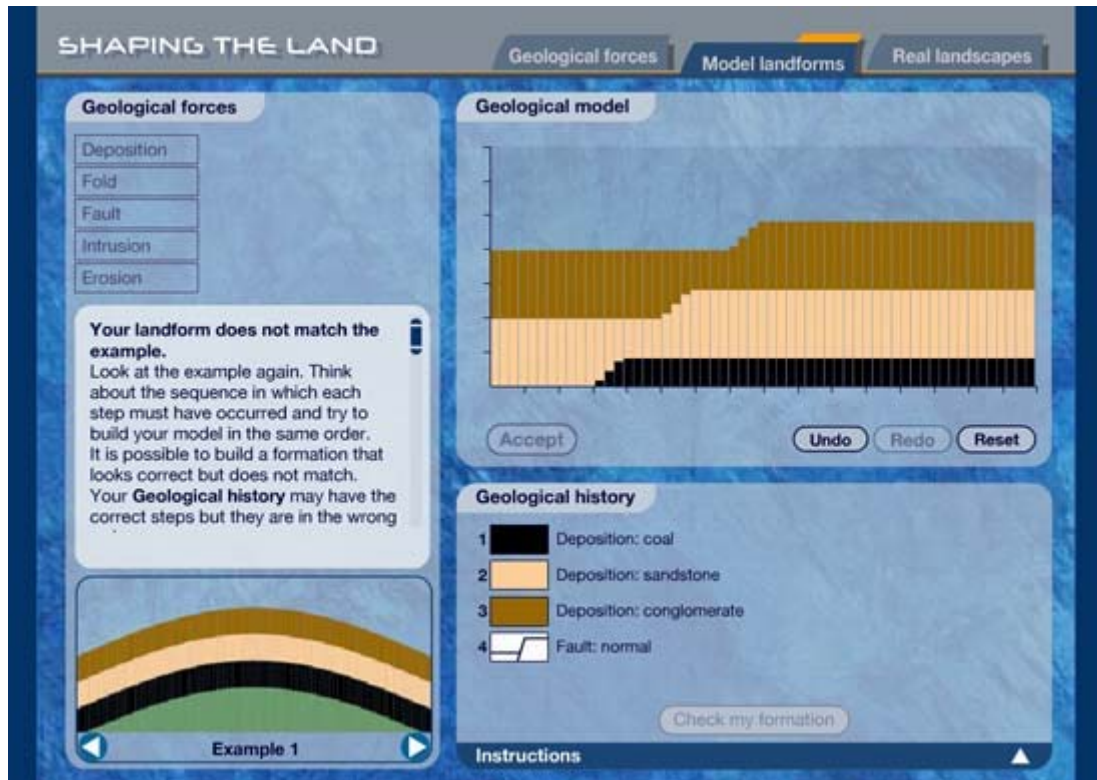
Students investigate the appearance of the Moon from Earth, and its appearance from the 'dark' side. They observe that only one side of the Moon can be seen from Earth and that the Moon rotates once during its orbit of Earth. Students then answer a series of questions. For example: In which positions of the Moon's orbit will Moon base Z be exposed to sunlight?

Lunar cycles: Earth glow

Students are able to use the model to view the Earth from the near side of the Moon. They observe that Earth reflects sunlight and appears to have phases when viewed from the Moon. Students then answer a series of questions by experimenting with the model. For example: How long would night-time last for a group of astronauts working at Moon base X?

Shaping the land (Years 5–10)

In the Shaping the land series, students learn about the ongoing and dynamic processes (deposition, folding, faulting, erosion, intrusion) that interact to form and reshape the Earth's crust.



Learning objects	LO ID	Years
Shaping the land: geological forces	534	5–10
Shaping the land: model landforms	535	5–10
Shaping the land: real landscapes	536	5–10
Shaping the land 🧩	533	5–10

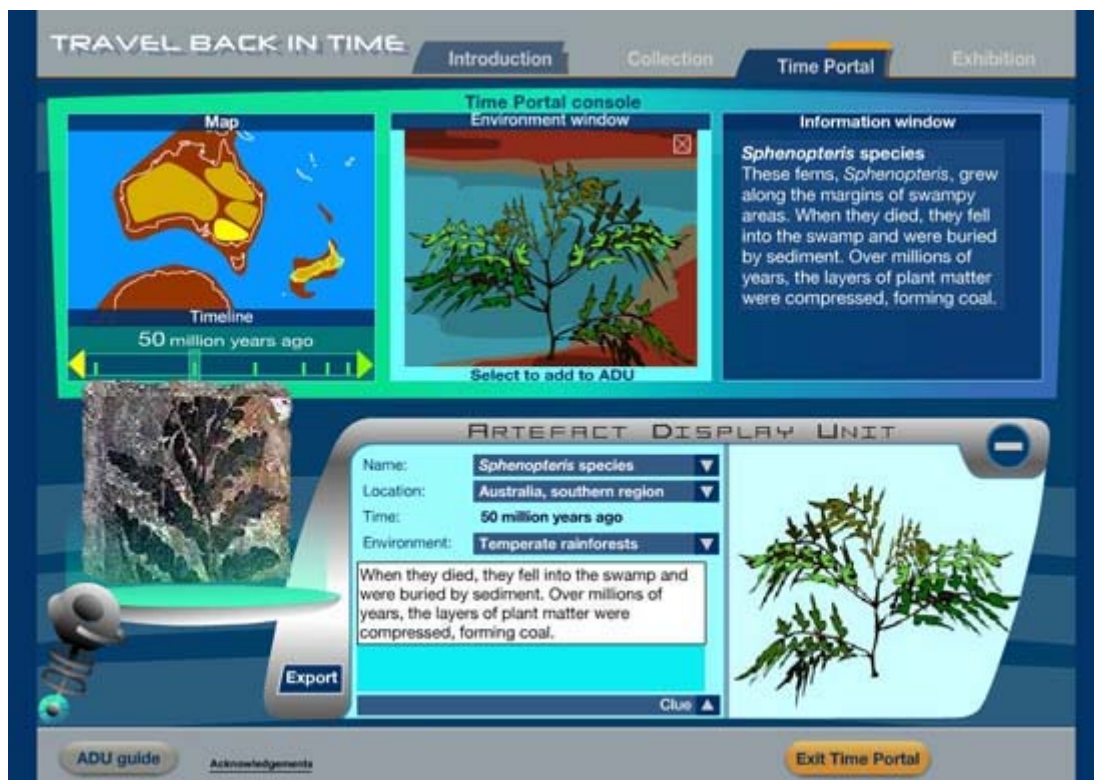
'Shaping the land: real landscapes' and 'Shaping the land' contain non-TLF content. See Acknowledgements in the learning objects.

Students examine cross-sections and actual geological landforms and are challenged to determine the geological events that have led to their formation.

'Shaping the land' is an aggregated learning object combining the three other learning objects in a sequence.

Travel back in time (Years 7–9)

In the Travel back in time series, students explore the concept of geological time and develop an understanding that geologists collect evidence (for example, rocks and animal and plant fossils) that provides clues to the geological past.



Learning objects	LO ID	Years
Travel back in time	493	7–9
Travel back in time [no spoken instructions]	497	7–9
Travel back in time: Time map	498	7–9

This series contains non-TLF content. See Acknowledgements in the learning objects.

Travel back in time: Time map

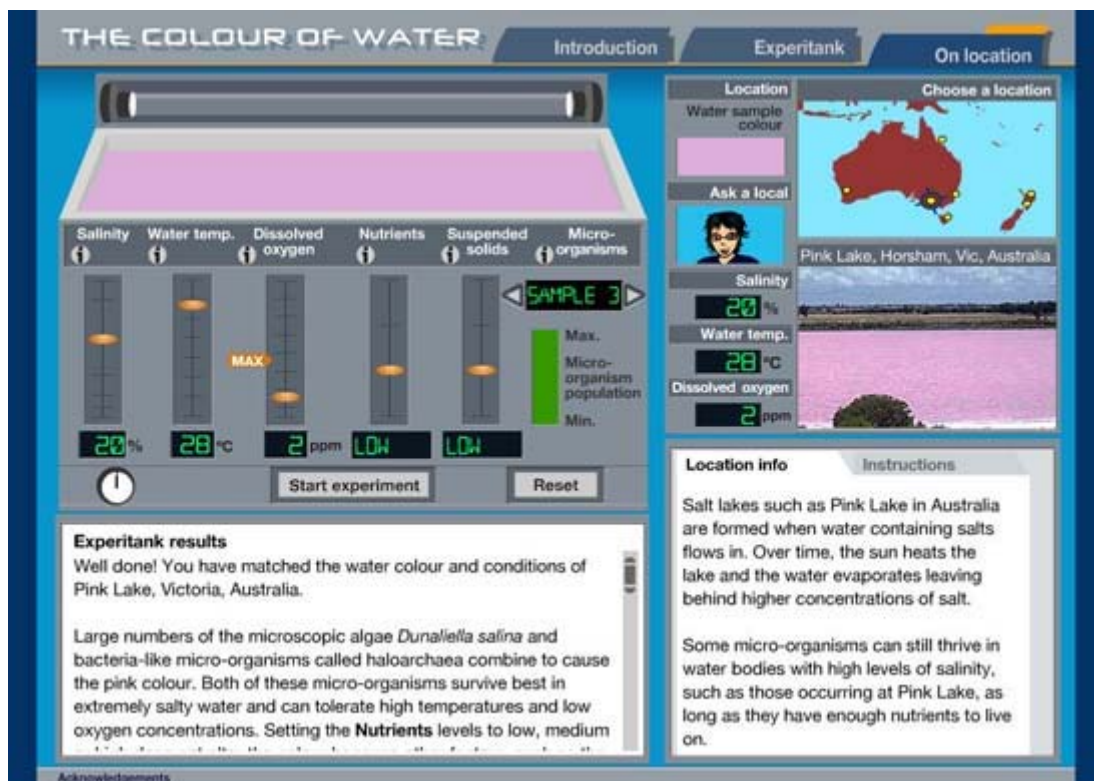
The 'Time map' enables students to see how the land masses of Australia and New Zealand have changed over the last 110 million years. They can also learn about climate changes over time in the Australasian region.

Travel back in time

Students act as curators in a futuristic museum and collect, categorise, label and display geological exhibits for an exhibition. They can select from four different collections to build their exhibition. The interactive 'Time portal' enables students to travel back in time and gather information about past climates and habitats to include in their exhibition. The learning object also allows students to add extra text to an exhibit, and details about each exhibit can be printed.

The colour of water (Years 7–10)

Students explore and experiment with the conditions found in various bodies of water to understand the impact these conditions will have on the colour of the water.



Learning objects	LO ID	Years
The colour of water: experitank	562	7–10
The colour of water: experitank [no spoken instructions]	563	7–10
The colour of water: Blue Lake	564	7–10
The colour of water: Blue Lake [no spoken instructions]	565	7–10
The colour of water: Green Lake	566	7–10
The colour of water: Green Lake [no spoken instructions]	567	7–10
The colour of water: Pink Lake	568	7–10
The colour of water: Pink Lake [no spoken instructions]	569	7–10
The colour of water: park pond	570	7–10
The colour of water: park pond [no spoken instructions]	571	7–10
The colour of water: Jervis Bay	572	7–10
The colour of water: Jervis Bay [no spoken instructions]	573	7–10
The colour of water: Freycinet Peninsula	574	7–10
The colour of water: Freycinet Peninsula [no spoken instructions]	575	7–10
The colour of water: Great Barrier Reef	576	7–10
The colour of water: Great Barrier Reef [no spoken instructions]	577	7–10
The colour of water 🧊	560	7–10
The colour of water [no spoken instructions] 🧊	561	7–10

This series contains non-TLF content. See Acknowledgements in the learning objects.

The colour of water: experitank

Students explore the different factors that can affect the colour of water bodies in a controlled environment. They can vary temperature, salinity or the micro-organisms present plus other variables to discover the impact these have on water colour.

The colour of water: *[location name]*

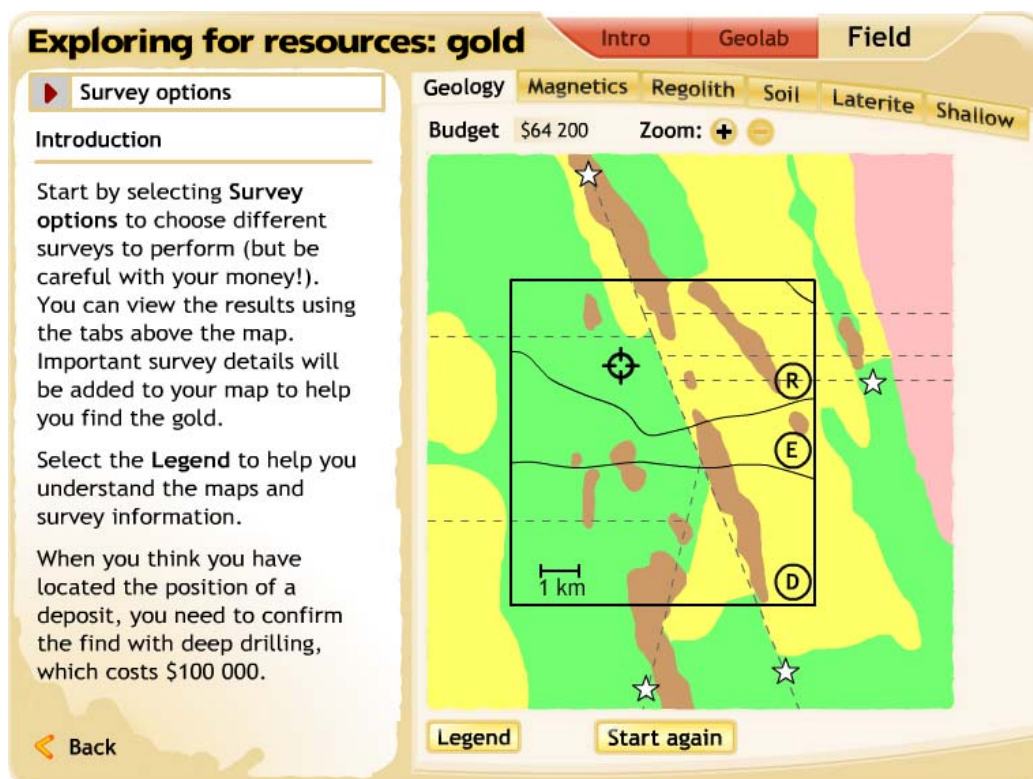
Each of the colour of water locations challenges students to correctly match the water conditions that occur in various bodies of water around Australia and New Zealand. By referencing information provided by a 'local', and through experimentation, they arrive at the actual conditions that lead to the characteristic colour of the waters concerned.

The colour of water

This is a aggregated learning object combining the other learning objects

Exploring for resources* (Years 9–10)

Students find out how different resources (gold, diamonds, nickel, copper and oil) are formed. In the role of an exploration geologist, students evaluate the resource potential of different areas in Australia and New Zealand and select appropriate exploration methods to economically locate the various resource deposits.



Learning objects	LO ID	Years
Exploring for resources: gold	5923	9–10
*Exploring for resources: copper	5924	9–10
*Exploring for resources: nickel	5925	9–10
*Exploring for resources: oil	5926	9–10
*Exploring for resources: diamonds	5927	9–10

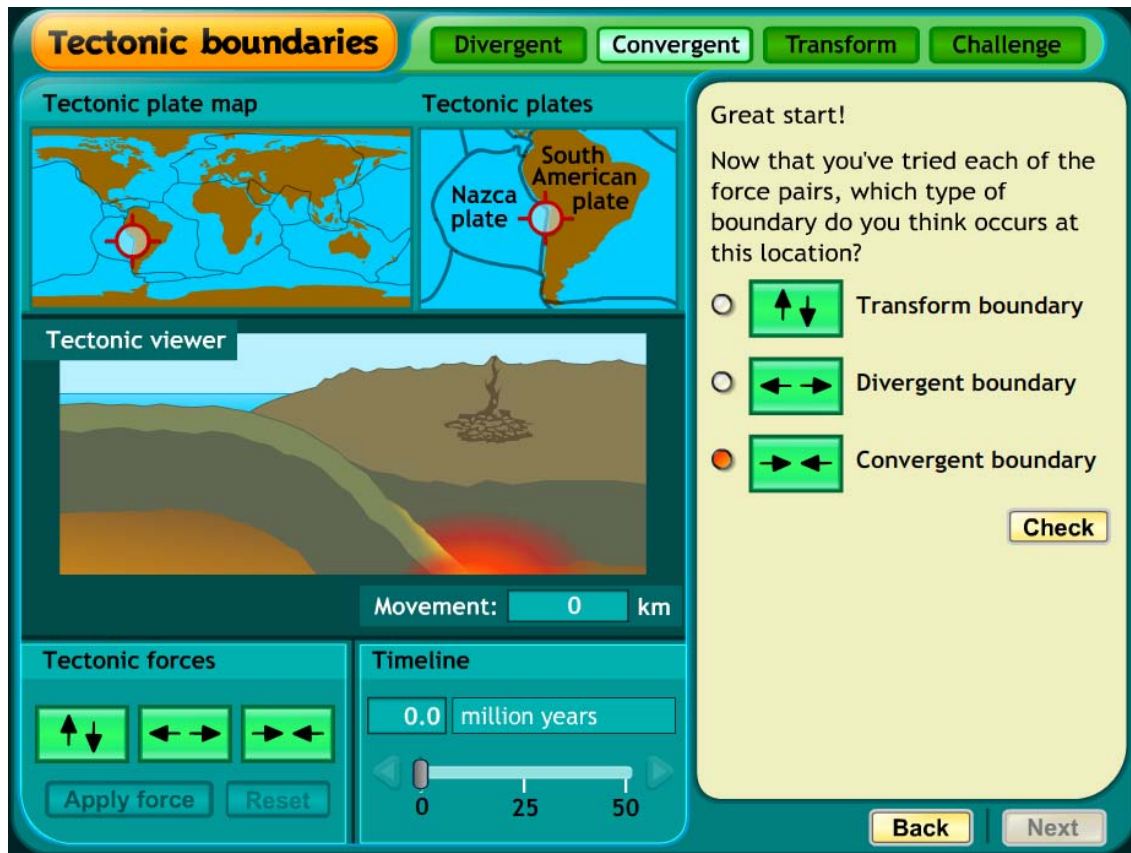
*Learning objects in development. This series contains non-TLF content. See Acknowledgements in the learning object.

The learning objects in the series:

- explain the methods geologists use to find resources
- illustrate the processes leading to the formation of the resources
- introduce geological maps and explain their use in resource exploration
- allow students to conduct virtual field surveys and use geological methods to pinpoint deposits (for example, aerial magnetic survey, regolith map, surface soil sampling, laterite sampling, shallow and deep drilling)
- challenge students to interpret geological data and to economically locate resource deposits within a given budget
- support repeated use by randomly generating resource deposits to discover
- provide scaffolded feedback to guide the student.
- Each learning object has a similar format; the geological tests available differs depending on the resource.

Tectonic boundaries* (Years 9–10)

Students use models of tectonic processes to understand geologic events on Earth. Students apply their understanding of plate tectonics to world regions and explain how major geological features were created.



Learning objects	LO ID	Years
*Tectonic boundaries: divergent	5831	9–10
*Tectonic boundaries: convergent	5832	9–10
*Tectonic boundaries: transform	5833	9–10
*Tectonic boundaries: challenge	5834	9–10
Tectonic boundaries 	5830	9–10

*Learning objects in development. This series contains non-TLF content. See Acknowledgements in each learning object.

These learning objects:

- allow students to model the effect of different tectonic forces on plate boundaries over time
- illustrate processes occurring at divergent, convergent and transform boundaries, including the Mid-Atlantic Ridge, the Andes, the San Andreas Fault, the Himalayas and the Tonga–Kermadec Trench.
- ask students to predict, identify and explain geological processes and features at divergent, convergent and transform boundaries in different locations
- provide structured feedback to student input
- explain the origins of catastrophic geological events, such as earthquakes, tsunamis and volcanoes
- test students' understanding of plate movements and tectonic forces through multiple-choice questions

Tectonic boundaries: challenge


Students test their understanding in a variety of unfamiliar locations.

Tectonic boundaries

This is an aggregated learning object combining the four other learning objects.

Tectonics investigator* (Years 7–10)

Students investigate some of the scientific evidence which leads to our understanding of the current model of the Earth's structure. They also look at the scientific observation of magnetic stripes at divergent plate boundaries and how this supports tectonic plate theory.

Learning objects	LO ID	Years
*Tectonics investigator: Earth's structure	5827	7–10
*Tectonics investigator: magnetic stripes	5828	7–10
*Tectonics investigator: hot spots	5829	7–10
Tectonics investigator 	5826	7–10

*Learning objects in development. This series contains non-TLF content. See Acknowledgements in each learning object.

These learning objects:

- allow students to investigate aspects of tectonic plate theory by viewing animations and manipulating models
- test student understanding and interpretation through multiple-choice questions
- provide structured feedback to student input.

Tectonics investigator: Earth's structure

Students investigate, analyse and interpret a model of the Earth's internal structure through animations and scientific data. In a jigsaw activity students fit the Earth's tectonic plates together and then identify characteristics of the plates.

Tectonics investigator: magnetic stripes

Students investigate tectonic plate behaviour and identify how plate movements have produced many features of the Earth's surface. Students investigate the formation of magnetic stripes at divergent plate boundaries and interpret the role of magnetic stripes in support of tectonic plate theory.

Tectonics investigator: hot spots

Students control plate movement to model the formation of hot spots. Students observe how hot spots can create seamounts and island chains and deduce how this process supports tectonic plate theory.

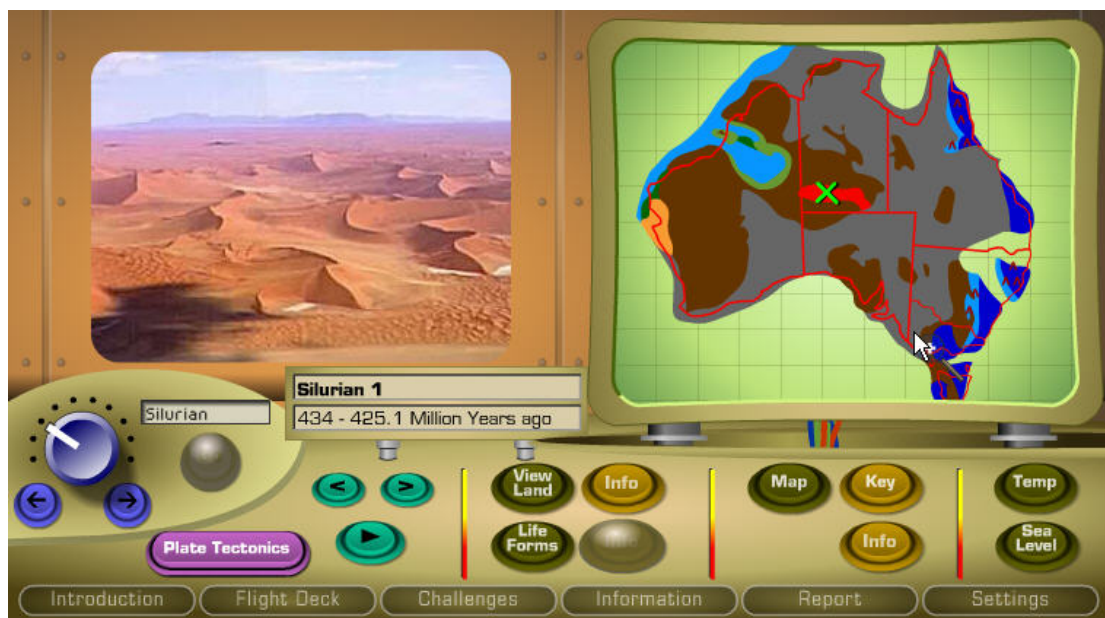
Tectonics investigator

This is an aggregated learning object combining the three other learning objects.

Content from other sources

Down to Earth (Years 5–9)

The Down to Earth series of learning objects develops students' understanding of Australia's geological history, the relationship between landscapes and the formation of rocks and minerals across time, the use of minerals in everyday items and the work of geological scientists.



Learning objects	LO ID	Years
Down to Earth: paleotraveller	925	5–8
Down to Earth: rock back in time	926	8–10
Down to Earth: metals matter	927	5–8

All learning objects in this series contain non-TLF content. These materials are licensed to Curriculum Corporation. Copyright is retained by Minerals Council of Australia, except where indicated in the Acknowledgments.

Each of the learning objects in the series has a range of interactive tools to allow student exploration.

Down to Earth: paleotraveller

In this learning object, students use a range of interactive tools and maps to

- explore changes in the Australian landmass, environments and living things over the last 545 million years
- compare climatic conditions and sea levels over geological time
- relate geological changes in the Earth's surface to plate tectonics
- identify major periods in the geological time scale.

The object includes a glossary and challenge questions.

Down to Earth: rock back in time

This learning object is similar to 'Down to Earth: paleotraveller' but the focus is on when, where and how a range of rock samples (eg coal, diamond, granite, sandstone) were formed in Australian geological time.

Down to Earth: metals matter

This learning object allows students to:

- identify metals commonly found in household objects
 - relate demand for commodities to supply of mineral resources
 - relate properties of metals and metalloids to their industrial applications
 - link the periodic table to descriptions of the properties and uses of metals and metalloids
 - use an interactive notebook to record and print facts about commodities, metals and metalloids.
 - use an interactive calculator and global map to work out relationships between world demand for commodities and supply of mineral resources.
 - explore detailed information about recycling metals in Australia.
- The object includes a series of questions which could be used to create a worksheet.

Exploring Earth’s structure (Years 5–9)

In Exploring Earth’s structure students explore the physical conditions and composition of major geological layers within the Earth and identify relationships between physical conditions and properties of rock present under the Earth’s crust.



Learning objects	LO ID	Years
Exploring Earth's structure: Earth probe	3067	5–9

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Get into geology (Years 5–12)

In the Get into geology series students explore a range of tools and instruments used by geologists and examine the formation of rocks. Students compare sedimentary, igneous and metamorphic rocks and use physical and chemical tests to identify rock types.

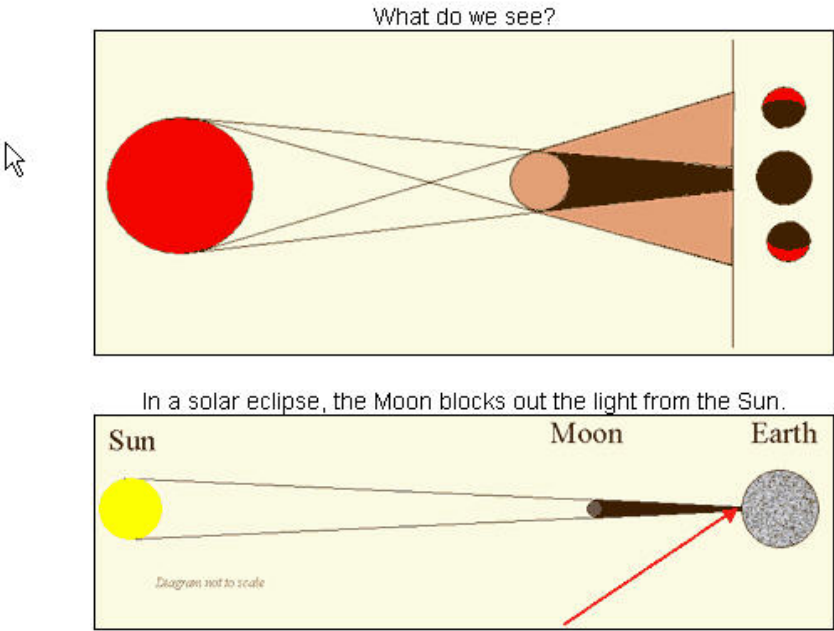


Learning objects	LO ID	Years
Get into geology [Windows version] 🎮	3063	5–12
Get into geology: tools of the trade	3064	5–12
Get into geology: what rock is that? [Windows version]	3065	5–12
Get into geology: superposition puzzle	3066	5–12

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Following the Moon (Years 5–9)

Students look at how sunlight is blocked during solar and lunar eclipses and examine diagrams showing positions of the Sun, Moon and Earth.



The Moon's umbra falls on the Earth. If the umbra passes over where you are you see a total eclipse of the Sun.



Learning objects	LO ID	Years
Following the Moon: eclipses and shadows	3068	5–9

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

The wonders of our universe (Years 5–9)

The Wonders of the universe series enables students to explore the Earth’s place in the universe and examine images of the local solar system, spiral galaxies and superclusters.

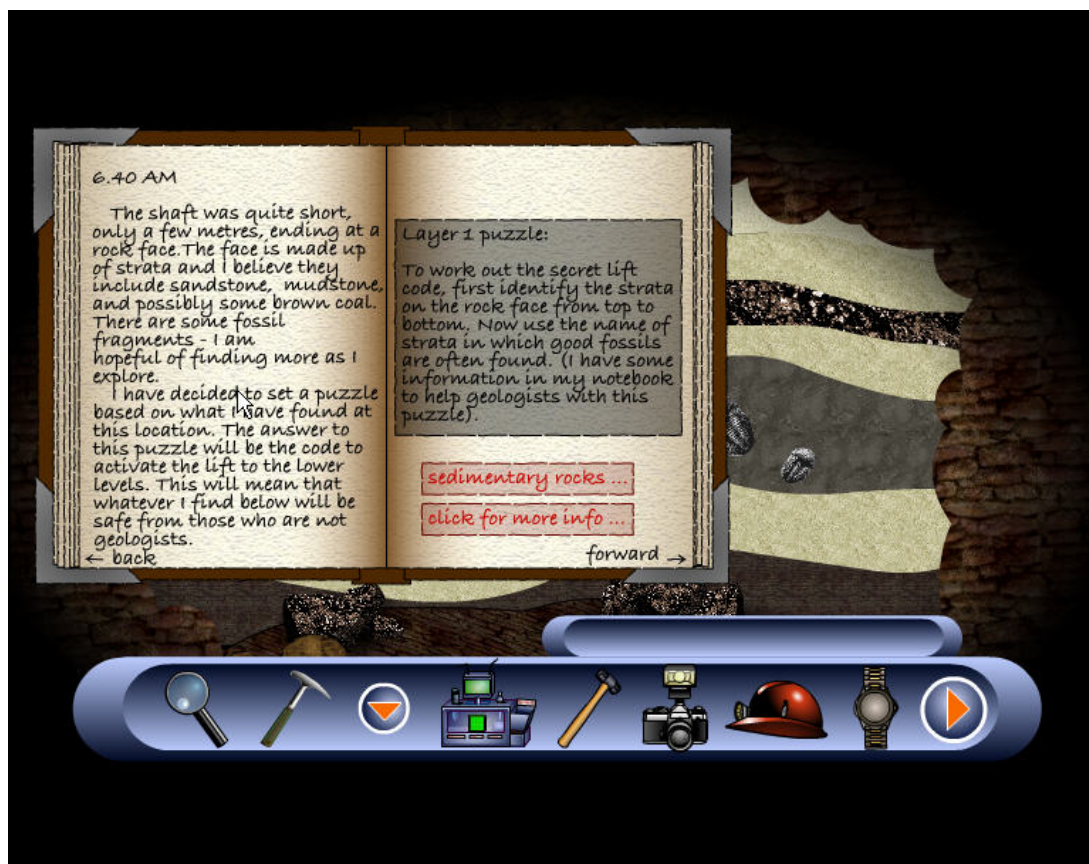


Learning objects	LO ID	Years
The wonders of our universe: space traveller	3069	5–9

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

The secret of Itsall Mine (Years 9–12)

This series enables students to explore methods used in geology and palaeontology. Students differentiate between igneous, metamorphic and sedimentary rocks by comparing the properties of rock samples.



Learning objects	LO ID	Years
The secret of Itsall Mine	3013	9–12

This learning object includes a facility for entering code words so that students can resume the game at a later stage.

This material is licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Life and living

The Life and living learning objects released to date are grouped into the following series.

Garden detective (Years P–2)

The Garden detective series allows students to explore and classify many small living creatures found in Australian and New Zealand gardens.



Learning objects	LO ID	Years
Garden detective: explore a New Zealand garden	1182	P–2
Garden detective: group New Zealand animals	1183	P–2
Garden detective: New Zealand garden 🇳🇵	1181	P–2
Garden detective: explore an Australian garden	1118	P–2
Garden detective: group Australian animals	1119	P–2
Garden detective: Australian garden 🇦🇺	699	P–2

Students are able to move around different habitats in the garden manipulating a magnifying glass to see which creatures live where. They are then able to select each creature to obtain information about it and add it to a collection before releasing it back to its habitat.

Garden detective: explore a New Zealand garden

Students examine the New Zealand garden with the magnifying glass looking for different creatures. Once found, a description of the creature with some of its distinguishing characteristics is displayed. Students can then choose whether to include the creature in their collection or to move on to look for others. They print the collection and continue on to make several collections. There are 24 creatures hidden in the garden.

Garden detective: group New Zealand animals

Students use the magnifying glass to find New Zealand creatures in the garden. In this learning object students are challenged to find groups of animals with like characteristics. For example, students are asked to find three animals with wings.

Garden detective: New Zealand garden

This is an aggregated learning object combining the two other New Zealand garden learning objects in a sequence.

Garden detective: explore an Australian garden

Students examine the Australian garden with the magnifying glass looking for different creatures. Once found, a description of the creature with some of its distinguishing characteristics is displayed. Students can then choose whether to include the creature in their collection or to move on to look for others. They print the collection and continue on to make several collections. There are 24 creatures hidden in the garden.

Garden detective: group Australian animals

Students use the magnifying glass to find Australian creatures in the garden. In this learning object students are challenged to find groups of animals with like characteristics. For example, students are asked to find three animals with wings.

Garden detective: Australian garden

This is an aggregated learning object combining the two other Australian garden learning objects in a sequence.

Food chains (Years P–2)

The Food chains series helps students understand how plants and animals get the energy to live.



Learning objects	LO ID	Years
Food chains: introduction	1147	P–2
Food chains: the town	894	P–2
Food chains: the desert	1143	P–2
Food chains: the wetlands	1144	P–2
Food chains: the farm	1145	P–2
Food chains: the forest	1146	P–2

Students are able to create simple food chains that show the flow of energy from the sun to plants and on to animals. An animated sequence introduces students to the way energy flows through a food chain and clear graphics and visual cues are presented to support students' efforts. The series offers audio support, and scaffolding of the learning tasks is not text dependent.

Food chains: introduction

This is a simple animation that introduces students to the concept of a food chain. It can stand alone as a resource, but is also packaged as an introduction to the other objects in this series.

Food chains: the town

Students create simple food chains starting with the energy from the Sun, and then incorporate plants and animals typically found in a city park. Each of the food chains the students create is recorded as a clear, simple graphic representation.

Food chains: the wetlands

Students create simple food chains starting with the energy from the Sun, and then incorporate plants and animals typically found in a wetlands environment. Each of the food chains the students create is recorded as a clear, simple graphic representation.

Food chains: the farm

Students create simple food chains starting with the energy from the Sun, and then incorporate plants and animals typically found on a farm. Each of the food chains the students create is recorded as a clear, simple graphic representation.

Food chains: the forest

Students create their own simple food chain with the energy from the sun, and then incorporate plants and animals typically found in a forest. Each of the food chains the student creates is recorded as a clear, simple graphic representation.

Animal search (Years 1–2)

The Animal search series allows students to analyse the physical features of a group of animals and to use that information to classify the animals as fish, amphibian, reptile or mammal.



Learning objects	LO ID	Years
Animal search: is it a mammal?	766	1–2
Animal search: is it a reptile?	1135	1–2
Animal search: is it an amphibian?	1136	1–2
Animal search: is it a fish?	1137	1–2
Animal search 🧩	1134	1–2

Each learning object targets a specific animal classification: mammals, fish, amphibians or reptiles. The series has audio support to assist pre-readers and also provides clear visual feedback.

Animal search: is it a mammal?

Students are presented with a selection of animals and must determine which of them are mammals. Common misconceptions are addressed by including animals such as a crocodile. Students first identify animals that have, for example, a backbone. Animals without a backbone are eliminated and after further interaction the mammal is discovered based on a feature such as the ability to make milk to feed its young.

Animal search: is it a reptile?

Students are presented with a selection of animals and must determine which of them are reptiles. Common misconceptions are addressed by including animals such as a tortoise. Students first identify animals that have, for example, a backbone. Animals without a backbone are eliminated and after further interaction the reptile is discovered based on a feature such as whether the animal has tough, dry skin and is covered in scales.

Animal search: is it an amphibian?

Students are presented with a selection of animals and must determine which of them are amphibians. Common misconceptions are addressed by including such animals as an eel. In making their decision students first identify a group of animals that have, for example, a backbone. Animals without a backbone are eliminated and after further interaction the amphibian is discovered based on a feature such as whether the animal lays eggs when it is an adult.

Animal search: is it a fish?

Students are presented with a selection of animals and must determine which is a fish. Common misconceptions are addressed by including such animals as a jellyfish. Students first identify a group of animals that have, for example, a backbone. Animals without a backbone are eliminated and after further interaction the fish is discovered based on a feature such as whether the animal breathes with gills.

Animal search

This is an aggregated learning object combining the four other learning objects.

Human body (Years 3–4)

The Human body series enables students to explore the structure and function of features of the human body through simulation, animation and interactivity.



Learning objects	LO ID	Years
Take a deep breath	21	3–4
Superhuman	22	3–4
In digestion	1	3–4
Fish out of water	23	3–4
Human body 	64	3–4

Take a deep breath

Students visit a virtual lab where a girl is exercising, and learn about the circulatory and respiratory systems.

Superhuman

Students are able to change a human skeleton so that it exhibits the characteristics of other animals; they explore the interrelatedness of body structures. The learning object includes a printable worksheet for designing customised 'super humans'.

In digestion

Students interactively follow the passage of a range of food through the human body and learn about the major digestive processes.

Fish out of water

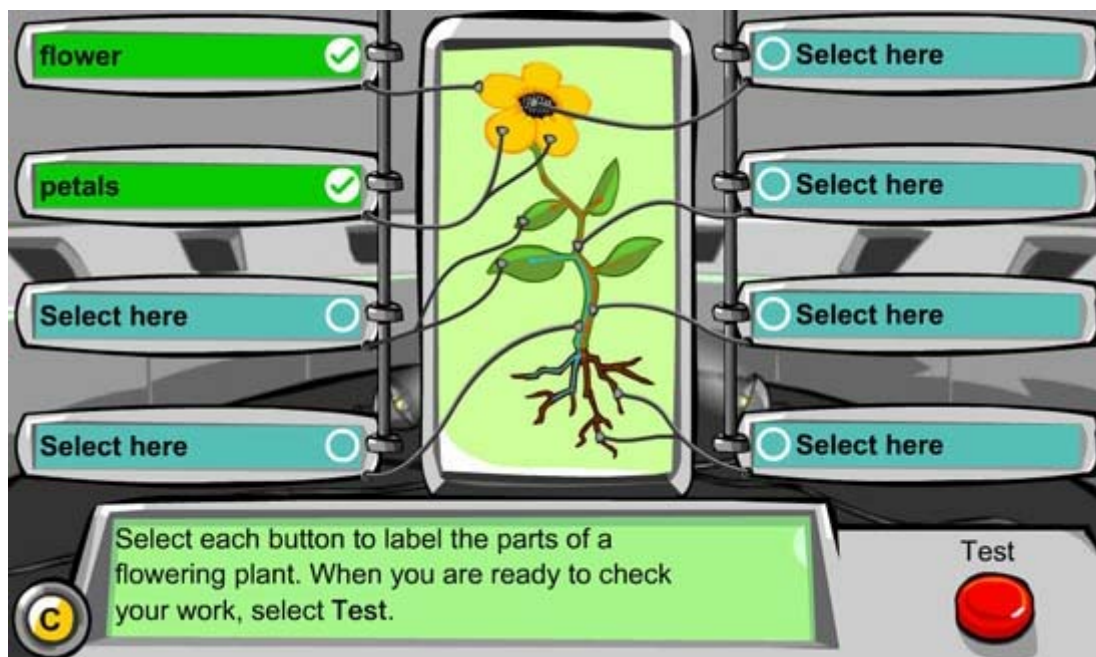
Students can select from a choice of three animals (a human, a frog or a fish) to test how each breathes and whether it can survive on land or in water.

Human body

This is an aggregated learning object combining the four other learning objects in a sequence.

Plant life (Years 3–4)

The Plant life series enables students to explore the structure and function of flowering plants.



Learning objects	LO ID	Years
What on Earth?	30	3–4
Plant scan	31	3–4
Plant life 🧩	66	3–4

What on Earth?

Students learn about the structure and function of plants through the animation of an alien who is in charge of testing living things on the planet Earth. They explore the needs of a plant (water flow, nutrients, carbon dioxide and the Sun) and the parts of a plant (flower, petals, leaves, seeds, stem, roots, and water and food tubes).

Plant scan

Students undertake a quiz on plant parts and functions. They label features of plants and match the correct function with plant parts.

Plant life

This is an aggregated learning object combining the two other learning objects in a sequence.

Surviving in a habitat (Years 3–4)

In the Surviving in a habitat series students explore different habitats to understand why particular plants and animals live there.



Learning objects	LO ID	Years
Who lives here?	24	3–4
Who's for dinner?	25	3–4
Platypus life cycle	28	3–4
Alien life form	29	3–4
Surviving in a habitat 🎮	65	3–4

'Who lives here?' and 'Surviving in a habitat' contain non-TLF content. See Acknowledgements in the learning objects.

Who lives here?

Students explore a north-eastern Australian rainforest habitat for visual and sound clues about the animals that live there. They write a survey report, including observations and conclusions, and can check if their predictions are correct.

Who's for dinner?

Students examine a food chain and food web from a billabong habitat. Then, in game format, they play the role of a tadpole, a fish or a heron. The aim is to find enough food to eat and avoid predators so their animal can grow and breed.

Platypus life cycle

Choose your own adventure-style exploration of the life cycle of a platypus. Students visit a platypus habitat and make choices to help the survival of the platypuses and their babies.

Alien life form

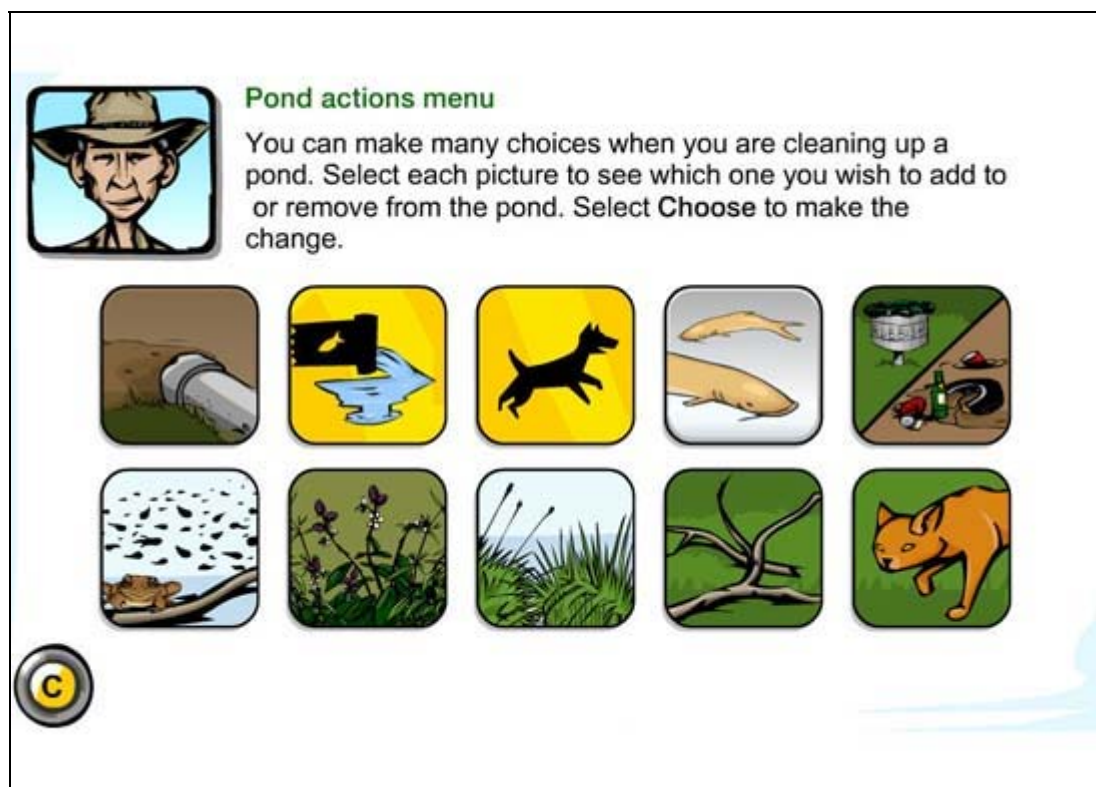
Students design a plant, choosing different combinations of leaves, seeds and roots, so that it will survive in a specific environment (mangroves, cool rainforest, mountain slopes or arid land). They check results and receive feedback on selecting the plant features to suit the environment.

Surviving in a habitat

This is an aggregated learning object combining the four other learning objects in a sequence.

Human impact (Years 3–4)

The Human impact series enables students to explore the human influence on the environment. The interactive activities are reinforced with options to look up further information and answer questions.



Learning objects	LO ID	Years
Old Bernie's story	26	3–4
Old Bernie's pond	27	3–4
Why recycle?	32	3–4
Earth alert	33	3–4
Human impact 🧩🧩	67	3–4

Old Bernie's story

Students interview Old Bernie about a local pond and its environment near where Bernie and his family have lived for generations. Students question Bernie about the ecology of the pond and how things have changed. Bernie replies via video clips.

Old Bernie's pond

Students help to restore Old Bernie's Pond, which has been polluted and invaded by introduced species, to its original state. Students choose possible solutions for restoring the pond, check the ecological outcomes of the restoration choices, and try other options until the pond is healthy. They earn a Pond Restorer certificate.

Why recycle?

Students meet a group of children finishing their lunch at school. Each school child chooses to dispose of their plastic lunch bag in a different way. Students predict where the bags might end up and the possible environmental consequences. They learn about the durability of plastics and the environmental benefits of recycling.

Earth alert

Students tune in to an environmental news program called 'Earth alert'. They solve four ecological problems involving pest animals or human activities: domestic cats, European

wasps, sea stars, and native animals killed by careless drivers. The learning object includes suggestions for exploring solutions to an environmental problem in the students' local area.

Human impact

This is an aggregated learning object combining the four other learning objects.

Frog pond habitat (Years 3–9)

The Frog pond habitat series provides students an opportunity to investigate, gather, synthesise and evaluate data in virtual environments.

Environmental evaluation project: Frog pond habitat

Select a species for more information.

Data tools

- Measure dissolved oxygen
- Measure temperature
- Measure pH
- Measure phosphorus

Today

Oxygen (mg/L)	10.0
Temperature (°C)	
pH (0–14)	6.5
Phosphate (mg/L)	

Notebook ◀ Back Next ▶

1 Measure water quality

Use the data tools to measure the water quality and see if it has changed over time. Select a tool and then move it into the pond. Once you have taken the measurements, select **Import pond data** to transfer today's data into the table. Then select **Next**.

	This year	1 year ago	2 years ago	3 years ago	4 years ago
Dissolved oxygen (mg/L)		6.3	8.0	8.0	11.0
Temperature (°C)		17.0	19.0	18.0	20.0
pH (0–14)		7.0	6.5	7.0	7.0
Total phosphorus (mg/L)		0.43	0.35	0.25	0.28

Learning objects	LO ID	Years
Environmental field project: frog pond habitat	419	3–6
Environmental evaluation project: frog pond habitat	418	5–9

This series contains non-TLF content. See Acknowledgements in the learning objects.

Environmental field project: frog pond habitat

In this virtual field trip students explore four sub environments of a pond environment (the pond, a grassy bank, a rocky bank, trees and shrubs). They gather data using appropriate sampling tools (magnifying glass, camera, net, fish trap, hand, and bucket) and record their observations in a Notebook. Using the printable Report builder, students compile a report about what makes the pond a good habitat for the plants and animals that live there. They can view a species description and video for each animal collected. The report requires them to explain how each animal meets its basic needs for food, water, shelter and protection.

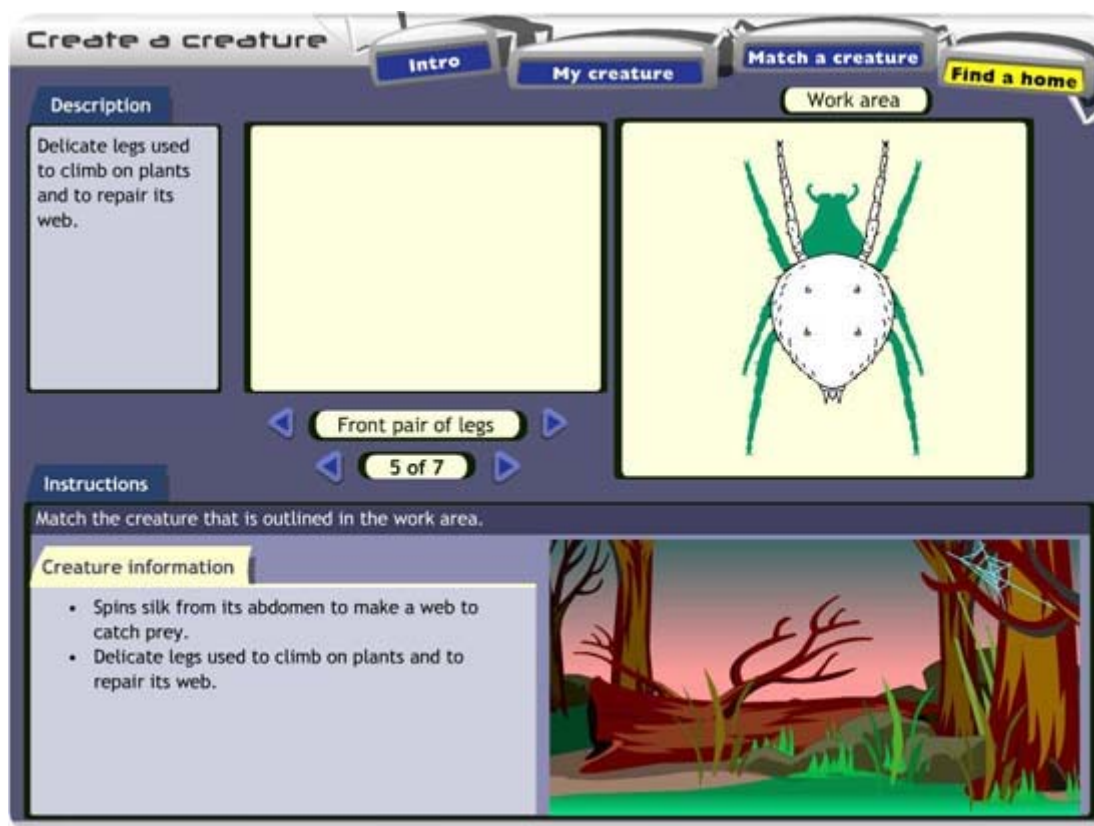
Environmental evaluation project: frog pond habitat

Based on a real habitat, this learning object aims to immerse the students in a virtual investigation of the likely causes of decline in a frog population. Students test, analyse and synthesise a range of ecological graphic and statistical data to investigate their hypothesis as to the most likely cause of the decline of the green and gold bell frog. Students use an interactive notebook to view data and record observations and to help build their hypothesis. The Report Builder allows students to select relevant data and compile their report.

The learning design is open ended and inquiry based with some structured and scaffolded feedback, and students must adequately justify their hypothesis with evidence.

Create a creature (Years 5–6)

The Create a creature series is an innovative way of helping students understand the different body parts of a large number of creatures, for example wolf spider, cricket, scorpion, dragon fly. Students examine the impact these body parts have on both the attributes and habitat of the creature.



Learning objects	LO ID	Years
Create a creature: my creature	1123	5–6
Create a creature: match a creature	1124	5–6
Create a creature: find a home	1125	5–6
Create a creature 🧩	755	5–6

Create a creature: my creature

Students explore descriptions of the features of small creatures, including the body parts and uses for these body parts. They then use the palette of body parts to create their own creature in the Work area. Students are asked to describe the name, habitat, food requirements and size of the creature they have created. Their creations can be printed.

Create a creature: match a creature

Students discover the identity of a creature displayed in the Work area by matching each of its body parts with corresponding elements from the palette of body parts and by reading the descriptions. As each body part is matched, its attributes are listed to aid identification of the creature. When all body parts have been correctly matched, they are asked a series of questions about the anatomy of the creature to help identify it.

Create a creature: find a home

Students must place a creature within its most appropriate habitat. Students discover the identity of creature by matching each of the body parts with corresponding elements from the palette.

Create a creature

This is an aggregated learning object combining the three other learning objects in a sequence.

Eyeball challenge (Years 5–8)

In the Eyeball challenge series, students explore the way in which the vision of different animals varies.



Learning objects	LO ID	Years
Eyeball challenge: eye facts	442	5–8
Eyeball challenge: wall tile puzzle	443	5–8
Eyeball challenge: rock bridge puzzle	446	5–8
Eyeball challenge: killer bees puzzle	447	5–8
Eyeball challenge: mission 1 🧩	441	5–8
Eyeball challenge: door keys puzzle	444	5–8
Eyeball challenge: stone wheel puzzle	445	5–8
Eyeball challenge: slingshot puzzle	1187	5–8
Eyeball challenge: mission 2 🧩	542	5–8

Within each learning object students use the Eye facts to investigate the structure and function of the eyes of six different animals: dog, cat, bee, fish, eagle and human. They discover how these animals see things in different ways because their eyes have different characteristics.

Using the information discovered in the Eye facts students find their way through an ancient temple by choosing animal eyes best suited to avoiding hazards. Students must successfully navigate through the temple, solving puzzles as they proceed, to reach the treasure.

Eyeball challenge: eye facts

'Eyeball challenge: eye facts' contains only the Eye facts and no puzzles.

Eyeball challenge: mission 1

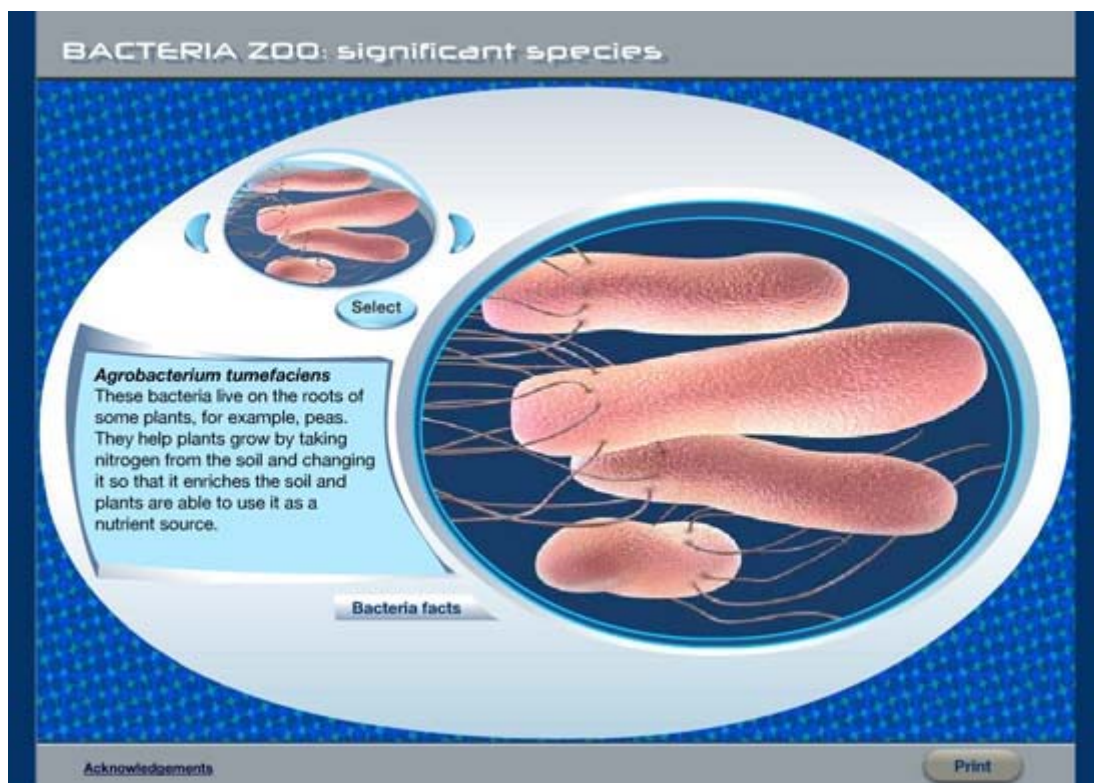
This is an aggregated learning object combining the killer bees, rock bridge and wall tile puzzles.

Eyeball challenge: mission 2

This is an aggregated learning object combining the door keys, slingshot and stone wheel puzzles.

Bacteria zoo (Years 5–8)

In the Bacteria zoo series, students are challenged to explore and understand the concept of bacteria and their diversity, and the roles of bacteria in our world. Using a magnifier, students locate bacteria in different environments, and are then required to identify and classify the different bacteria according to their shape, location and movement.



Learning objects	LO ID	Years
Bacteria zoo: the zoo	529	5–8
Bacteria zoo: the zoo [no spoken instructions]	530	5–8
Bacteria zoo: collect new specimens	531	5–8
Bacteria zoo: collect new specimens [no spoken instructions]	532	5–8
Bacteria zoo: significant species	1519	5–8
Bacteria zoo 🧩	527	5–8
Bacteria zoo [no spoken instructions] 🧩	528	5–8

This series contains non-TLF content. See Acknowledgements in the learning objects.

Bacteria zoo: the zoo

Students are introduced to the concept of finding and categorising bacteria by shape.

Bacteria zoo: field collection

Students can explore and categorise bacteria in a number of different ways.

Bacteria zoo: significant species

'Bacteria zoo: significant species' provides a 'catalogue' of bacteria, including species information and large-format, high-quality images of bacteria, all of which can be printed for classroom use.

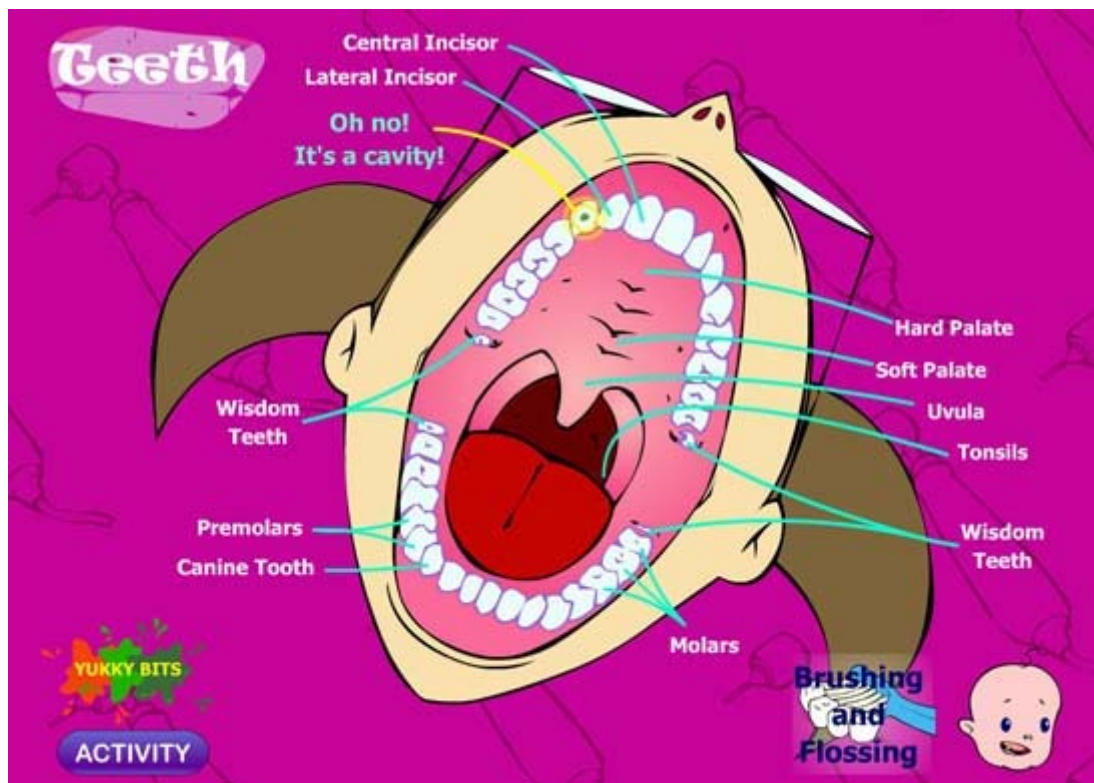
Bacteria zoo

This is an aggregated learning combining 'Bacteria zoo: the zoo' and 'Bacteria zoo: field collection' in a sequence.

Content from other sources

Body parts (Years 5–7)

The Body parts series of learning objects includes activities and quizzes for teaching and learning about the human body and its functions.



Learning objects	LO ID	Years
Blood	717	5–7
Digestive system	719	5–7
Endocrine system	720	5–7
Hearing	721	5–7
Heart and circulation	722	5–7
Immune system	723	5–7
Kidneys and bodily fluids	724	5–7
Muscles	725	5–7
Respiratory system	726	5–7
Skeleton	727	5–7
Skin	728	5–7
Teeth	730	5–7
Vision	731	5–7

These materials are licensed to Curriculum Corporation. Copyright is retained by Liquid Animation.

Aches and pains (Years 5–7)

The Aches and pains series includes activities and quizzes for teaching and learning about health issues.

Diabetes

- What is diabetes?
- What causes diabetes?
- What happens in diabetes?
- Is diabetes preventable?
- Treatment for diabetes

What Is Diabetes?

Diabetes is where the sugar levels in your blood are too high. Its full name is "diabetes mellitus", diabetes meaning sweet because of the sugar. About 1 in 700 children and young people have diabetes mellitus or juvenile diabetes. Diabetes occurs when the body doesn't produce enough of the hormone insulin, a chemical messenger made by the Beta cells of the pancreas that controls the way the body uses sugar as fuel. Without insulin, your body cannot use sugar as fuel, so blood sugar builds up and the body runs out of energy.

BLOOD SUGAR LEVELS (normal)

mmol/L	mg/dl
10	180
8	144
6	110
4	72
2	36

BLOOD SUGAR LEVELS (diabetes)

mmol/L	mg/dl
10	180
8	144
6	110
4	72
2	36

How sugar makes fuel in your body ➔

Learning objects	LO ID	Years
Acne	732	5–7
Asthma	733	5–7
Breaks and fractures	734	5–7
Cancer	735	5–7
Colds and flu	736	5–7
Diabetes	737	5–7
Epilepsy	738	5–7
Headaches	739	5–7
High blood pressure	740	5–7
Sore ears	741	5–7
Stomach pains	742	5–7
Taste and smell	729	5–7
Tonsillitis	743	5–7

These materials are licensed to Curriculum Corporation. Copyright is retained by Liquid Animation.

Rainforest life (Years 5–8)

In the Rainforest life series, students help a scientist carry out field work, identify specimens and explore ecological interactions in a rainforest environment.



Learning objects	LO ID	Years
Rainforest life: identifying living things	3079	5–8
Rainforest life: interaction with living things	3080	5–8
Rainforest life: looking at cells	3081	5–8

This object includes worksheets for activities on insect identification, examining plants and animals, and detecting starch.

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Microscopes (Years 5–8)

Students compare the operation of microscopes: light, transmission electron microscope and scanning electron microscope.



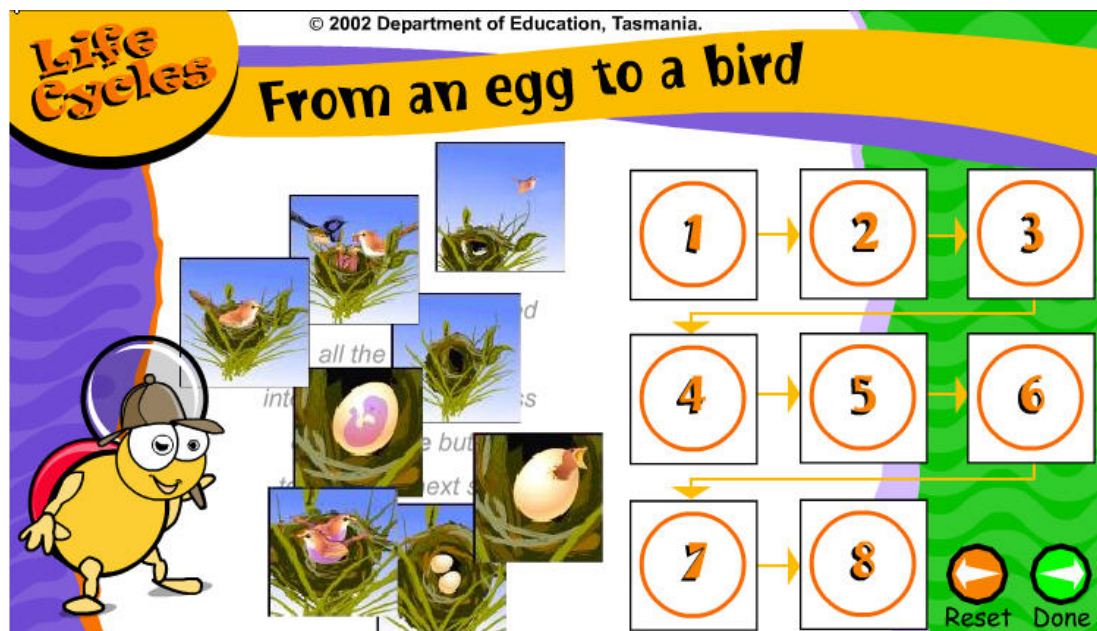
Learning objects	LO ID	Years
Microscopes	3082	5–8

This object includes worksheets on using microscopes and examining cells and micro-organisms.

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Life cycles (Years P–4)

The Lifecycle series of learning objects helps students understand the life cycle of a range of animals and plants.



Learning objects	LO ID	Years
Part of a pattern 🧩.	1472	P–4
Life cycles: birds	1361	P–4
Life cycles: butterflies	1358	P–4
Life cycles: crocodiles	1359	P–4
Life cycles: flowers	1360	P–4
Life cycles: gum trees	1363	P–4
Life cycles: whales	1364	P–4

Following an interactive exploration, each learning object requires students to represent lifecycle changes in offline tasks. The table below identifies the offline activity associated with each learning object.

Title	Student activity
Life cycles: birds	Storyboard
Life cycles: butterflies	Photograph
Life cycles: crocodiles	Flowchart
Life cycles: flowers	Calendar
Life cycles: gum trees	Timeline
Life cycles: whales	Graph

These materials are licensed to Curriculum Corporation. Copyright is retained by the Crown in Right of Tasmania.

Animal groups (Years P–4)

In the Animal groups series students explore the characteristics of a range of animals such as a crab, octopus, snake and tortoise or groups of animals such as mammals, reptiles and fish.



Vertebrates (with backbones)	Invertebrates (with no backbones)

Learning objects	LO ID	Years
Animal groups: at the zoo 1	1355	P–4
Animal groups: at the zoo 2	1356	P–4

Animal groups: at the zoo 1

Students identify whether animals are vertebrates or invertebrates.

Animal groups: at the zoo 2

Students explore the various characteristics of a group of animals, such as reproduction.

These materials are licensed to Curriculum Corporation. Copyright is retained by the Crown in Right of Tasmania.

The place that’s right for me (Years P–4)

Students explore a range of Australian environments and examine the adaptations of the animals to their habitat.



I like to eat insects, ants, spiders and other small lizards.

<< >>
page: 9

 sound
 help
Animal Builder

Learning objects	LO ID	Years
The place that’s right for me	1471	P–4

These materials are licensed to Curriculum Corporation. Copyright is retained by the Crown in Right of Tasmania.

Feral peril (Years 5–8)

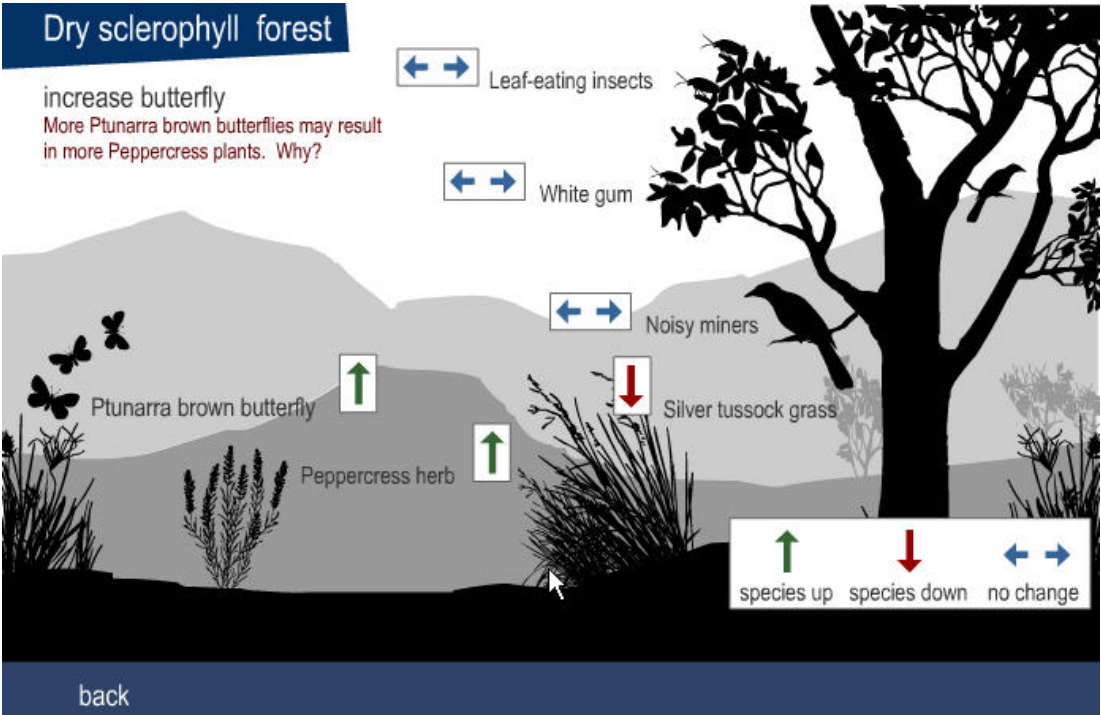
Students explore the ecology of introduced species in Australia and the impact of introduced species on native animals and plants.

Learning objects	LO ID	Years
Feral peril	1357	5–8

These materials are licensed to Curriculum Corporation. Copyright is retained by the Crown in Right of Tasmania.

Ecosystem balance (Years 5–10)

In the Ecosystem balance, students explore characteristics and ecology of Tasmanian plants and animals. Students explore the impact of a change in population of a range of species on other animals and plants.



Learning objects	LO ID	Years
Ecosystem balance	1446	5–10

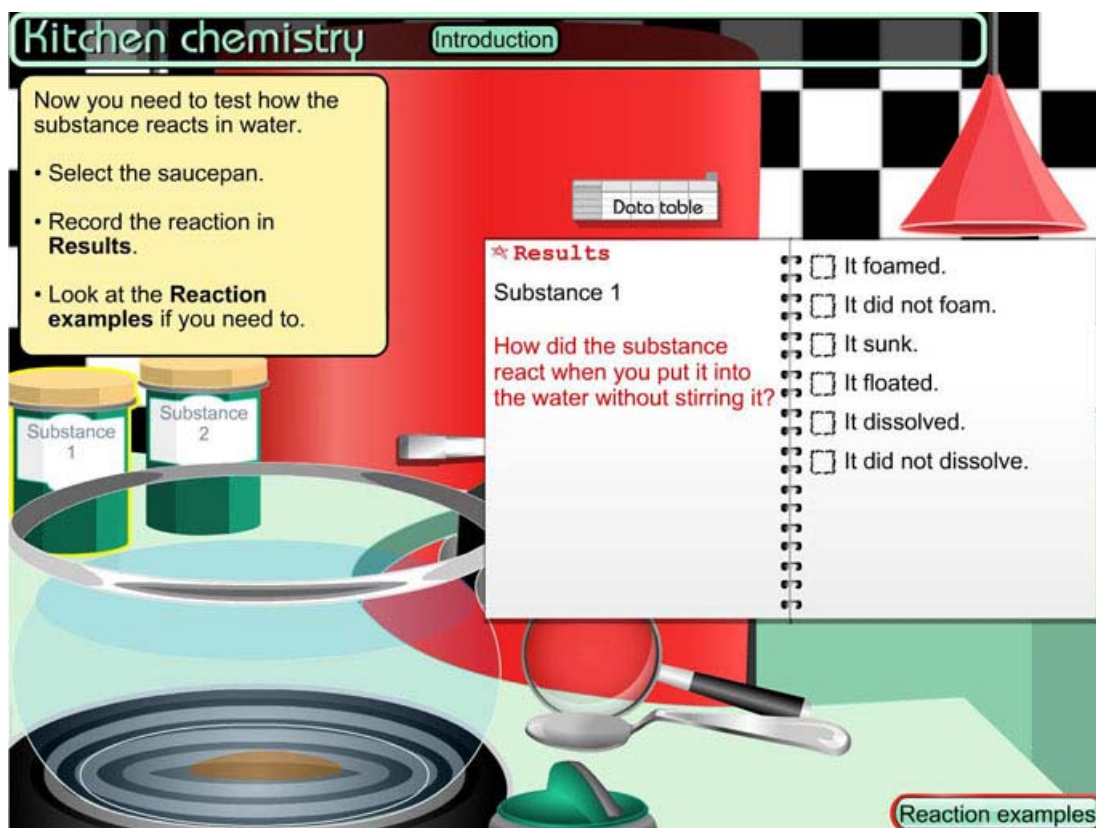
These materials are licensed to Curriculum Corporation. Copyright is retained by the Crown in Right of Tasmania.



Natural and processed materials

The Natural and processed materials learning objects released to date are grouped into the following series.

Kitchen chemistry (Years 3–4)

In the Kitchen chemistry series students observe and record changes that occur when common substances are added to water.



Learning objects	LO ID	Years
Kitchen chemistry: experiment: level 1	2367	3–4
Kitchen chemistry: experiment: level 2	2368	5–6
Kitchen chemistry: mystery: level 1	2369	3–4
Kitchen chemistry: mystery: level 2	2370	5–6
Kitchen chemistry: experiment and mystery: level 1 	2365	3–4
Kitchen chemistry: experiment and mystery: level 2 	2366	5–6

Kitchen chemistry: experiment: level 1

Students are exposed to scientific methodology through testing the physical properties of kitchen substances such as pepper, detergent and butter. They look at experiments that determine whether substances float or sink, foam or dissolve in hot or cold water. They also examine if stirring makes a difference. The students create a table of data based on the results.

Kitchen chemistry: experiment: level 2

‘Kitchen chemistry: experiment: level 2’ is identical in functionality to ‘Kitchen chemistry: experiment 1’ but the questions following the investigation stage are more complicated.

Kitchen chemistry: mystery: level 1

Students test the physical properties of two unknown kitchen substances, such as cream or olive oil, to determine whether they float or sink, foam or dissolve in hot or cold water and the impact stirring makes. Then they refer to a data table of known properties and identify the unknown kitchen substances.

Kitchen chemistry: mystery: level 2

'Kitchen chemistry: mystery: level 2' is identical in functionality to 'Kitchen chemistry: mystery 1' but there are more substances to test to solve the mystery.

Kitchen chemistry: experiment and mystery: level 1

This is an aggregated learning object combining 'Kitchen chemistry: experiment: level 1' and 'Kitchen chemistry: mystery: level 1'.

Kitchen chemistry: experiment and mystery: level 2

This is an aggregate learning object combining 'Kitchen chemistry: experiment: level 2' and 'Kitchen chemistry: mystery: level 2'.

Mystery substance (Years 3–6)

In the Mystery substance series, students carry out chemical tests on common substances, and observe and record changes that occur when common substances are heated or added to a range of liquid reagents.

Introduction Training Find the culprit Emergency case Mixed substances

Data table **Case of the stolen diamond**

Test	Iodine	Water	Vinegar	Heat
Substance				
Baking soda	No reaction, stays brown	Soluble	Fizzes, dissolves	Doesn't melt
Plain flour	Turns black	Insoluble	No reaction	Chars, but doesn't melt
Salt	No reaction, stays brown	Soluble	No reaction	Doesn't melt
Sugar	No reaction, stays brown	Soluble	No reaction	Melts, bubbles, goes brown
Talcum powder	No reaction, stays brown	Insoluble	No reaction	Doesn't melt

When the substance was tested with iodine it had no reaction and stayed brown.



So the substance could be:

☐ Baking soda
☐ Plain flour
☐ Salt
☐ Sugar
☐ Talcum powder

Now check the **Data table** to see what your substance could be.

Then choose what you think it is on the **Records sheet**.

Reactions table

Learning objects	LO ID	Years
Mystery substances: training	2360	3–6
Mystery substances: your first case	2361	3–4
Mystery substances: find the culprit	2362	5–6
Mystery substances: emergency case	2363	3–6
Mystery substances: mixed substances	2364	5–6
Mystery substance: pure substances 	2358	3–6
Mystery substance: pure and mixed substances 	2359	5–6

In the context of a police forensic laboratory, students try to solve crimes by identifying pure and mixed substances found at crime scenes. First, students create a data table of known substances. They then test an unknown substance and, referring to the data table, determine its identity. This learning object introduces students to the scientific method including the recording of experimental results in a notebook.

Mystery substances: training

Students carry out chemical tests on common substances such as salt, baking soda and sugar. They then observe and record how each substance reacts with a range of liquids and to heating. They then build a data table of chemical properties.

Mystery substances: your first case

In this object targeted at years 3–4, students are challenged to solve crimes (pampered cat, secret valentine, salty cake) by identifying a number of different pure substances. They do this by carrying out a series of chemical tests on common substances such as salt, baking

soda and sugar. They then observe the resultant reactions and record how each substance reacts with a range of testing liquids and to heating. Students then compare the chemical properties of unknown substances with a data table of known substances to discover what the mystery substance is and solve the crime.

Mystery substances: find the culprit

This object, targeted at years 5–6, is the same design as your 'Mystery substances: your first case' learning object but with more complex cases (stolen diamond, treasure hunt, stolen cakes).

Mystery substances: emergency case

Students are challenged to solve crimes by identifying a number of different pure substances. They do this by carrying out a series of chemical tests on common substances such as salt, baking soda and sugar. They then observe the resultant reactions and record how each substance reacts with a range of testing liquids and to heating. Students then compare the chemical properties of unknown substances with a data table of known substances to discover what the mystery substance is and solve the crime.

This learning object for years 3–6 further challenges students to see what are the smallest number of tests that can be performed to discover the mystery substance.

Mystery substances: mixed substances

Students are challenged to solve crimes by identifying a number of different pure substances from a mixed sample. They do this by carrying out a series of chemical tests on common substances such as salt, baking soda and sugar. They then observe the resultant reactions and record how each substance reacts with a range of testing liquids and to heating. Students then compare the chemical properties of unknown substances with a data table of known substances to discover what the mystery substance is and solve the crime.

Mystery substance: pure substances

This is an aggregated learning object combining 'Mystery substances: training', 'Mystery substances: your first case' and 'Mystery substances: emergency case'.

Mystery substance: pure and mixed substances

This is an aggregated learning object combining 'Mystery substances: training', 'Mystery substances: find the culprit', 'Mystery substances: emergency case' and 'Mystery substances: mixed substances'.

Chemical science (Years 5–6)

The Chemical science series enables students to explore the properties of materials and their uses in everyday life. Each of the learning objects in this series is set in a virtual laboratory. As Science Officers, students are equipped with materials and tools and required to perform experiments. Students use the 'predict, observe, explain' learning strategy prior to the experiment, and write a report after the process is completed.



Learning objects	LO ID	Years
Life without chemistry	34	5–6
Slime emergency	35	5–6
Mine rescue	36	5–6
Metal munchers	37	5–6
Save the lake	38	5–6
Skateboard race	39	5–6
Grumpy in the desert	40	5–6
Inter-galactic cook-off	41	5–6
Going down and burning up	42	5–6
Treasure puzzle	43	5–6

Life without chemistry

Students choose and test appropriate materials to construct everyday items in a virtual city.

Slime emergency

A broken-down spaceship is drifting towards a gigantic glob of suffocating space slime. The engine needs four different liquid fuels to get it going. Students test materials at different temperatures to find out which can be turned into liquid fuels.

Mine rescue

Three miners are trapped by fire. Students select and test gases to work out how to put out the fire, and then help the miners to breathe.

Metal munchers

A spaceship has landed on the metal munchers' planet. Students are required to give each metal muncher a piece of metal. If a metal muncher is given a piece of non-metal it takes a bite out of the spaceship. Students test materials for the main properties of metals.

Save the lake

Life in a lake is dying because of something in the water. Students work out possible sources of pollution by using chemical tests. They then match the chemicals they have found with local industrial activities and suggest strategies to save the lake.

Skateboard race

It is the finals of the Super Skateboard Championship and someone has stolen the wheels from Noppy's skateboard. Students test materials for strength and hardness, and help to make new wheels.

Grumpy in the desert

Bruce has crashed his four-wheel drive in the desert. The supplies have spilt and are mixed together. He is upset, confused and desperate for a cup of tea. Students recover the necessary ingredients from the mixed-up supplies. They separate the mixtures by using common chemical techniques such as distillation, filtration, centrifugation or magnetism.

Intergalactic cook-off

Set in a televised cookery show, students must pass the Kitchen Chemistry Test to become Grand Celebrity Chef. They are asked to find five reactions between cooking ingredients that cause a chemical change, for example acid-base reactions.

Going down and burning up

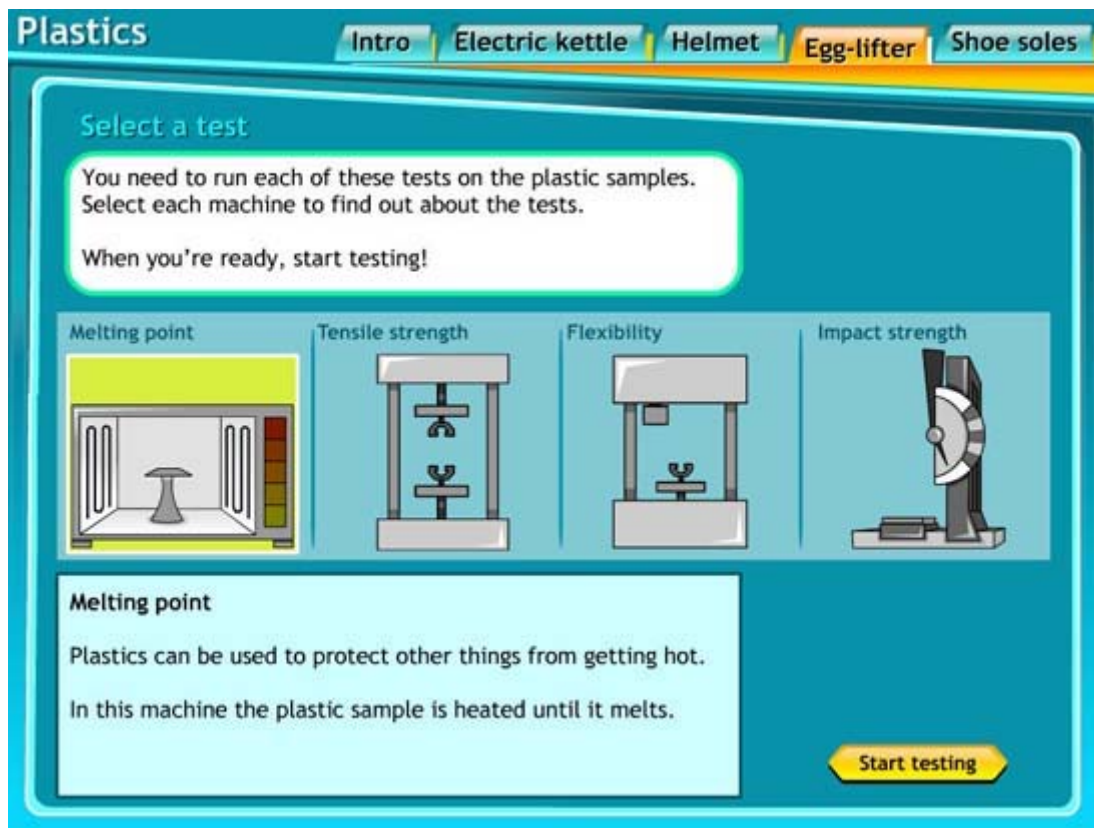
Students help the Hubble Telescope return to Earth for repairs. They are asked to build a heat shield to protect the space telescope from burning up when entering the Earth's atmosphere. They have to choose a material that does not easily burn, melt or transfer heat.

Treasure puzzle

A treasure map leads to a locked door. Students must find three acids to open the door and claim the treasure. They test everyday substances to identify which are acids.

Plastics (Years 7–8)

The plastics series allows students to explore and test the physical properties of a range of plastics and, in doing so, identify properties required in plastics used to make given products.



Learning objects	LO ID	Years
Plastics: electric kettle	2527	7–8
Plastics: helmet	2528	7–8
Plastics: egg-lifter	2529	7–8
Plastics: shoe soles	2530	7–8
Plastics 	2526	7–8

Students first investigate the properties of plastics used to make products such as DVDs and skateboard wheels, then identify the desirable properties needed for plastic in an electric kettle, an egg-lifter, a helmet, and shoe soles.

Students then test unknown plastic samples for properties such as melting point, tensile strength, impact strength and flexibility. The results are automatically recorded in a table. Students recommend which plastic is the most suitable for each product.

‘Plastics’ is an aggregated learning object combining the four other learning objects.

The elements (Years 7–8)

In The elements series students learn to differentiate between elements and compounds, classify elements according to their properties and locate elements in a periodic table.

Back to start

Mystery elements

When you find a match, move your mystery element to its correct place in the periodic table. Then select Next.

Helium
He

Atomic number: 2
Atomic mass: 4.0026
Melting point: -272 °C
Boiling point: -269 °C

State: Gas
Appearance: Colourless
Other: Lighter than air. Extremely unreactive. Insulator.

Mystery elements

Unreactive gas
Melting point: -272 °C
Boiling point: -269 °C
Appearance: Colourless
State: Gas
Other: Lighter than air. Extremely unreactive. Insulator.

Back

Next

Learning objects	LO ID	Years
The elements: find the elements	2550	7–8
The elements: classify elements	2551	7–8
The elements: elements analyser	2552	7–8
The elements: mystery elements	2553	7–8
The elements: fill the gaps	2554	7–8
The elements 🧩	2293	7–8

The elements: find the elements

Students use a chemical analysis tool to sort elements from compounds. Substances include table salt, water, plaster of Paris and mercury from a thermometer.

The elements: classify elements

Set in the context of another universe where elements have different properties, students use a chemical analysis tool to test properties of the alien elements. Like the periodic table, students build a table of properties to classify the elements. Then, using the patterns of properties within the table, they identify where new elements belong.

The elements: elements analyser

Students use a chemical analysis tool to test properties of elements. They identify key properties of each element, such as melting point and boiling point, before sorting the elements into categories such as non-metal, metalloid, reactive gas or unreactive gas. Finally, the students position groups of elements in the periodic table according to their properties

The elements: mystery elements

Students sort elements according to their properties into categories, such as non-metal, metalloid, reactive gas or unreactive gas, and position elements in the periodic table according to their properties.

The elements: fill the gaps

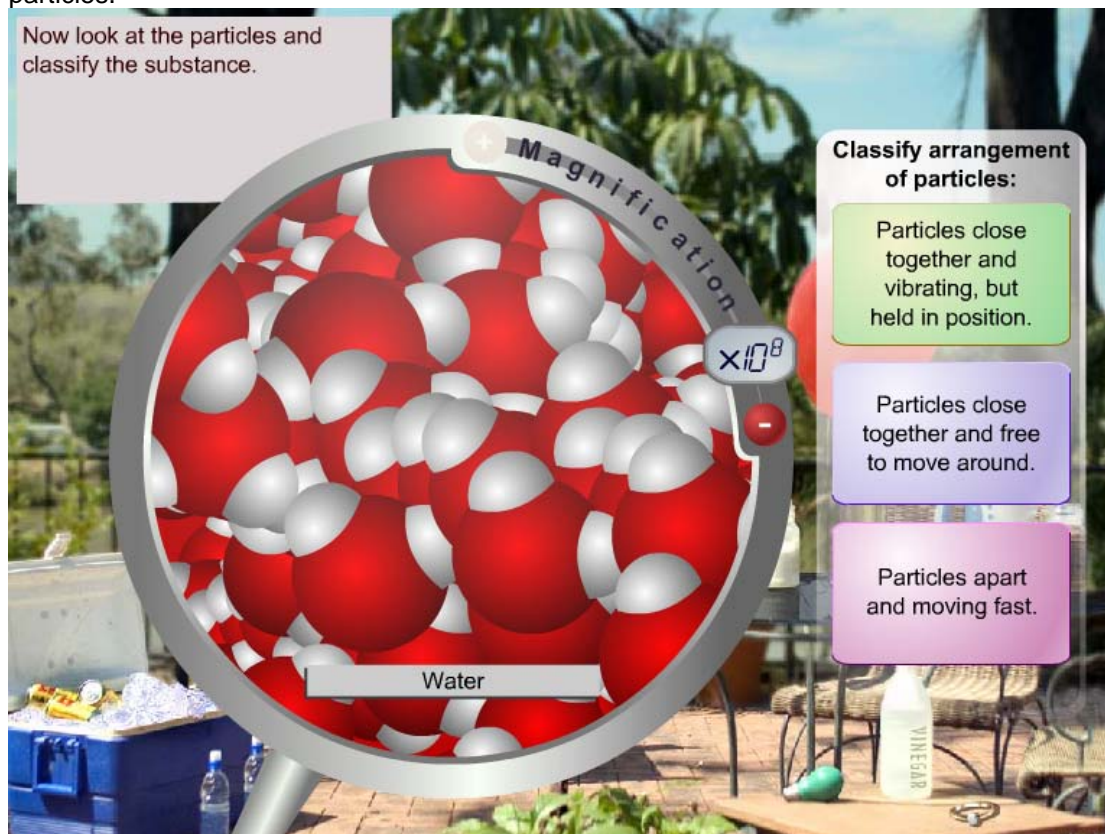
Students use the properties of known elements to classify others. They position elements in the periodic table and check properties, such as atomic number, boiling point and reactivity. Using the patterns of properties within the periodic table, they identify where other elements belong.

The elements

This is an aggregated learning object combining the five other learning objects.

Types of matter* (years 7–8)

This series introduces students to the particle theory of matter. Using a magnifying device that allows them to see the sub-microscopic structure of common household materials, students discover that all matter consists of particles, and that matter can be classified into different types depending on the structure (or arrangement) of those particles.



Learning objects	LO ID	Years
*Types of matter: particles	5820	7–8
Types of matter: solids, liquids, gasses	5821	7–8
*Types of matter: pure substances and mixtures	5822	7–8
Types of matter: elements and compounds	5823	7–8
*Types of matter: mixtures and compounds	5824	7–8
*Types of matter: identify types of matter	5825	7–8

* Learning objects in development

Each learning object

- Allows students to dynamically investigate the particle arrangement of common substances with a device that magnifies at x100 million magnification.
- Introduces the correspondence between macroscopic physical properties and microscopic particle arrangement
- Requires students to classify substances based on the arrangement and motion of their particles.
- Provides feedback to student input
- Includes an option to print a fact sheet summarising particle behaviour under investigation

Types of matter: particles

Students sort and classify substances into two categories: particles of an element which contain only one type of atom or those of a compound that contain more than one

Types of matter: solids, liquids, gasses

Students sort and classify substances as solids, liquids or gases, based on the arrangement and motion of their particles.

Types of matter: pure substances and mixtures

Students sort and classify substances into mixtures which contain particles of different types and pure substances which contain only one type.

Types of matter: elements and compounds

Students sort and classify substances as elements or compounds based on the arrangement of their particles. They use particle theory to explain why compounds can be broken down, and elements cannot.

Types of matter: mixtures and compounds

Students sort and classify substances as having only one type of molecule or more than one.

Types of matter: identify types of matter

In game format, students apply their understandings from the other learning objects in the series to identify and classify new substances.

pH* (Years 7–9)

This series of learning objects develops understanding that the pH scale is used to measure the degree of acidity of solutions; that acids and bases can be distinguished by their properties; that the properties of acids can be neutralised by bases and vice versa and that the degree of acidity of a solution depends on the concentration of hydrogen ions.

Select a substance on the shelf to test it.

Substances on the shelf: Car battery, Bicarbonate of soda solution, Salty water, Drain cleaner, Apple juice (marked with a green checkmark).

Findings table

Red litmus

Acids	Bases
• taste sour	• taste bitter
• can be corrosive	• can be corrosive
• change blue litmus to red	• change red litmus to blue
• don't change red litmus – it remains red	• don't change blue litmus – it remains blue
• don't change phenolphthalein indicator – it remains colourless	• change phenolphthalein indicator to deep pink
• release hydrogen gas when added to certain metals	• don't react with most metals

Properties table

Learning objects	LO ID	Years
pH: what is pH?	5815	7–9
*pH: acids and bases	5814	7–9
*pH: noughts and crosses	5816	7–9
*pH: aquarium	5817	7–9
*pH: pool	5818	7–9
*pH: changing pH	5819	7–9

*Learning objects in development

pH: what is pH?

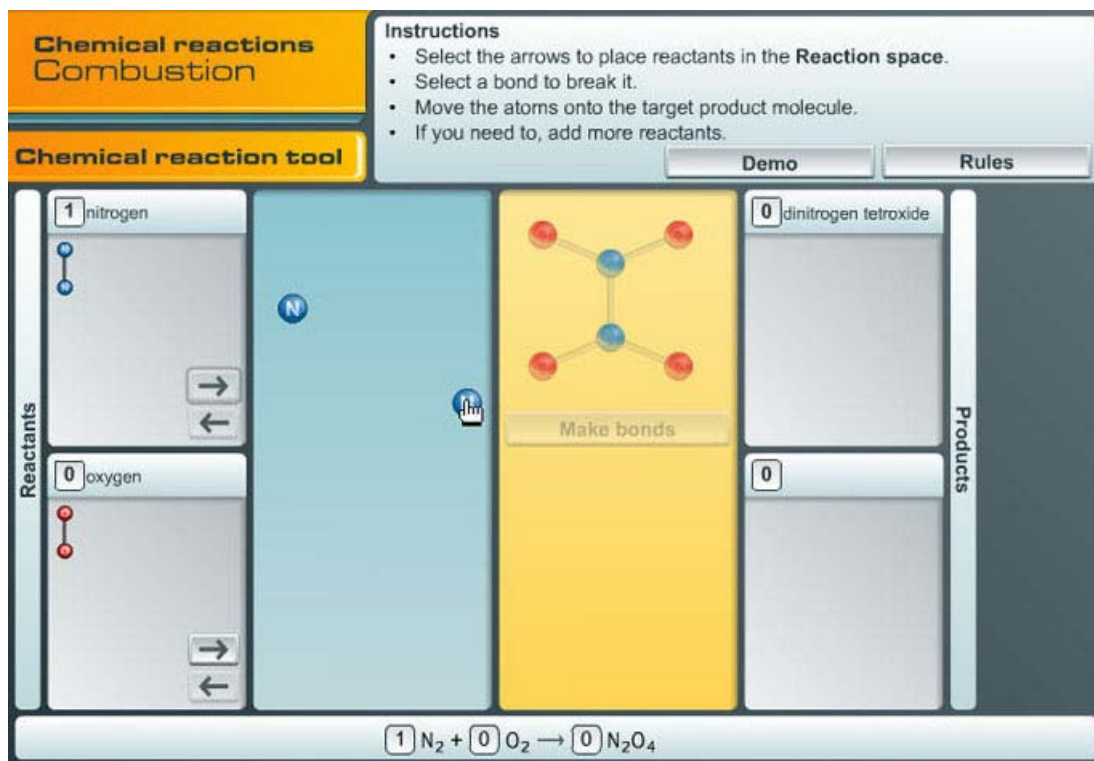
This learning object introduces students to the key concepts associated with pH. The learning object


- Illustrates how acids and bases in everyday household items can be distinguished using four different chemical tests
- Requires students to interpret test results to rank solutions in order of acidity
- Explains the pH scale and how it relates to acidic, basic and neutral solutions
- Requires students to use the pH scale, a pH meter and a universal indicator to distinguish acidic, basic and neutral solutions
- Includes an option to explore the mathematical basis of the pH scale
- Challenges students to use pH measurements to identify mystery solutions
- Provides visual and structured feedback

Details about all other learning objects in this series will be provided on their release.

Chemical reactions (Years 9–10)

The Chemical reactions series demonstrates the conservation of atoms and energy in chemical reactions and relates this to balancing equations.



Learning objects	LO ID	Years
Chemical reactions: combustion	2568	9–10
Chemical reactions: non-combustion	2569	9–10
Chemical reactions: balancing equations	2570	9–10
Chemical reactions: energy	2571	9–10
Chemical reactions: energy released by fuel	2572	9–10
Chemical reactions: reaction reshuffle	2573	9–10
Chemical reactions 	2296	9–10

All learning objects in this series except 'Chemical reactions: reaction reshuffle' contain non-TLF content. See Acknowledgements in the learning objects.

The learning objects in the series:

- simulate molecular collisions resulting in chemical reactions
- enable students to disassemble reactant molecules and reassemble the atoms into product molecules
- provide a tool to track and adjust the relative numbers of reactant and product molecules
- provide a tool to determine whether a chemical reaction is exothermic or endothermic
- provide opportunities to balance a range of chemical equations
- show that energy input is required to break bonds and energy is released when bonds are made
- relate the overall energy of a chemical reaction to the individual bond energies

- explain why the ranking of fuels is based on energy released per kilogram rather than energy released per mole.

Chemical reactions: combustion

Students investigate chemical reactions on the atomic scale by mixing reactant molecules and observe how their atoms rearrange into product molecules as they collide. Students then pull apart molecules and reassemble the atoms into new molecules using a reaction tool. They then balance chemical equations. The focus of this learning object is for students to balance combustion reactions.

Chemical reactions: non-combustion

Students investigate chemical reactions on the atomic scale by mixing reactant molecules and observe how their atoms rearrange into product molecules as they collide. Students then pull apart molecules and reassemble the atoms into new molecules using a reaction tool. They then balance chemical equations. The focus of this learning object is for students to balance non-combustion reactions.

Chemical reactions: balancing equations

Students investigate chemical reactions on the atomic scale by mixing reactant molecules and observe how their atoms rearrange into product molecules as they collide. Students then use a balancing equation tool whereby reactant and product atoms are clearly shown as students increase the reaction molecules.

Chemical reactions: energy

Students investigate chemical reactions on the atomic scale by mixing reactant molecules and observe how their atoms rearrange into product molecules as they collide. Students then pull apart molecules and reassemble the atoms into new molecules using a reaction tool. Users then balance chemical equations. As students break bonds and create new products the energy bar displays the resultant energy.

Chemical reactions: energy released by fuel

Firstly students investigate chemical reactions on the atomic scale by mixing reactant molecules and observe how their atoms rearrange into product molecules as they collide. Students then pull apart molecules and reassemble the atoms into new molecules using a reaction tool. They then balance chemical equations. As students break bonds and create new products the energy bar displays the resultant energy. Finally, they rank the fuels according to the amount of energy they release.

Chemical reactions: energy

Students investigate chemical reactions on the atomic scale by mixing reactant molecules and observe how their atoms rearrange into product molecules as they collide. Students are then asked a question on what they have observed during the reaction.

Chemical reactions: reaction reshuffle

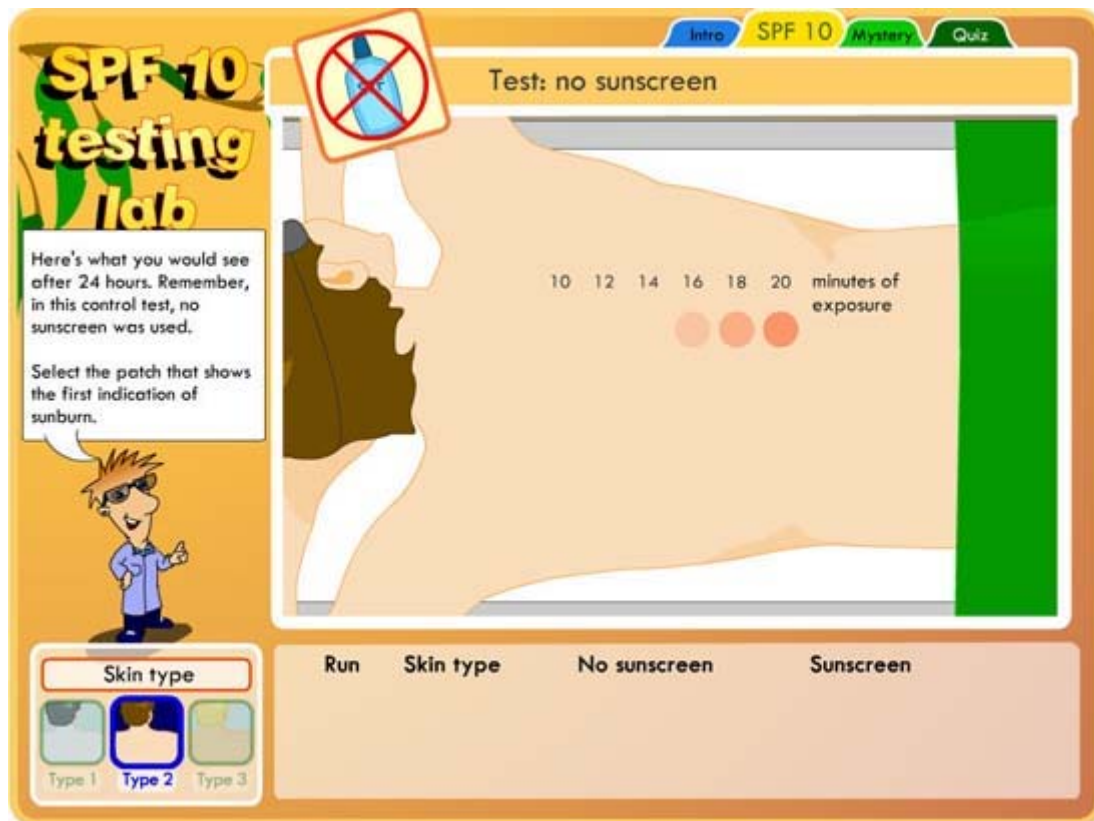
Students investigate the chemistry of reactions at a molecular level by examining collisions between molecules of two reactants. Students are able to adjust the ratios of the reactants and compare the outcomes, as well as identify the ratio of molecules involved in a balanced equation.

Chemical reactions

This is an aggregated learning object combining the six other learning objects.

Sunscreens (Years 9–10)

The Sunscreens learning object has been designed to help investigate the impact of sunscreen on different skin types.



Learning objects	LO ID	Years
Sunscreens: what's the fuss about 30+?	703	9–10

Sunscreens: what's the fuss about 30+?

Students examine the impact of ultraviolet light and levels of sunburn over different exposure times and use experimental data to confirm the relationship between Sun protection factor (SPF) and UV exposure time. They can also work out the SPF of some sunscreens and calculate safe exposure times for a range of skin types and sunscreens.

UV index (Years 9–10)

The UV index series enables students to interact with UV simulators to gain an understanding of ultraviolet (UV) radiation.

What is the UV Index?

My prediction

UV Index	Danger category
1 to 2	Low
3 to 5	Moderate
6 to 7	High
8 to 10	Very high
11+	Extreme

Spring

UV simulator

5.8
UV Index

Question 3

Jack's father, Ivan, is fishing in a boat on the lake. It's a sunny day, but his boat has a shade cover to protect him.

How protected is he from UV?
Select the correct surface and conditions in the table to predict the UV risk.

The correct UV rating is:

☐ Low
☐ Moderate
☒ High
☐ Very high
☐ Extreme

Check

	Clear; no shade	Thin cloud; no shade	Clear; shade	Thin cloud; shade
Grass	10		3	
Sand				5
Water	11		6	5
Snow	13			

Acknowledgements

Learning objects	LO ID	Years
UV index: simulator	1138	9–10
UV index: the highs and lows	1139	9–10

This series contains non-TLF content. See Acknowledgements in the learning objects.

UV index: simulator

Students are introduced to the UV index as a commonly used indicator of exposure to ultraviolet radiation and through experimentation, learn that the amount of UV light that reaches a person varies according to the reflectivity of their surroundings. Students investigate the amount of UV light that reaches a person in typical daily situations. They can experiment with levels of reflectivity and construct a table showing UV index measurements under a range of environmental conditions, including cloud, shade and ground surfaces (grass, sand, water, and snow).

UV index: the highs and lows


Students use a simulator to test the level of ultraviolet (UV) rays that reach the Earth at different times of the day. Students also construct and interpret graphs of relationships between UV index, time of day and seasons. Students answer a series of questions to demonstrate their understanding.

Content from other sources

Making water drinkable (Years 5–9)

Students look at the differences between elements, compounds and mixtures and explore solvents, solutions and the effects of temperature on solubility. Students also explore the water cycle and see how rainwater is treated to remove unwanted substances.

◀ Previous Page
Index
Next Page ▶

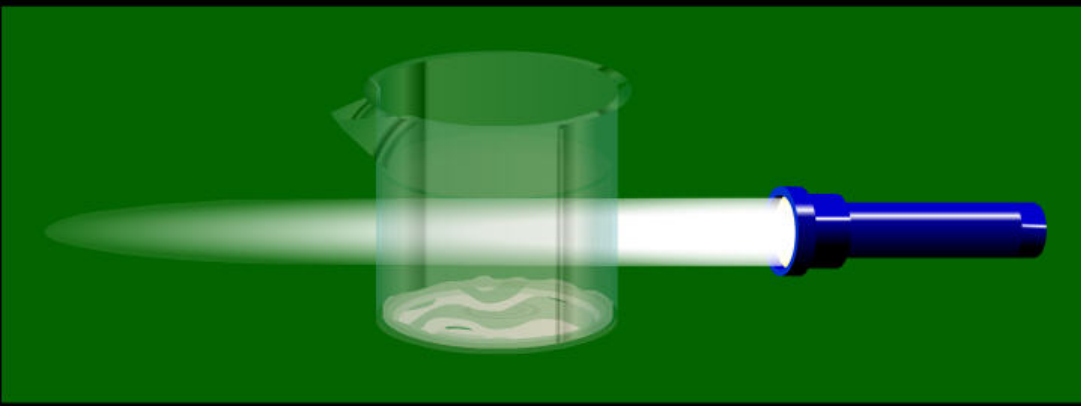


Making Water Drinkable

Flocculation


How are the clay particles being removed from the suspension? What is happening? *Explain in your workbook.*

◀◀
a beam of light now passes smoothly through the water
▶▶



⏮
⏸
⏭

★ Click the control buttons to see the movie. ★

Learning objects	LO ID	Years
Making water drinkable 	3198	5–9
Making water drinkable: mixtures	3100	5–9
Making water drinkable: water and us	3102	5–9
Making water drinkable: water treatment	3103	5–9
Making water drinkable: colloids	3104	5–9
Making water drinkable: water cycle jigsaw	3105	5–9

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

What the world is made of (Years 5–9)

Students identify the three states of matter and use the particle model to explain phase changes and properties of different states of matter.

Index
Next Page

What the World is made of

Introduction

What is the world, or for that matter, the universe, made of?
Just take a quick look around you. What do you see?

A computer, ... a pot plant, ... the carpet, ... your drink bottle,
...or a glass of milk, ... even the curtain blowing in the wind?

Learning objects	LO ID	Years
What the world is made of	3070	5–9
What the world is made of: states of matter	3249	5–9
What the world is made of: sorting matter	3250	5–9
What the world is made of: modelling matter	3251	5–9
What the world is made of: changes of state	3252	5–9
What the world is made of: properties of liquids	3253	5–9
What the world is made of: particles, heat and movement	3254	5–9

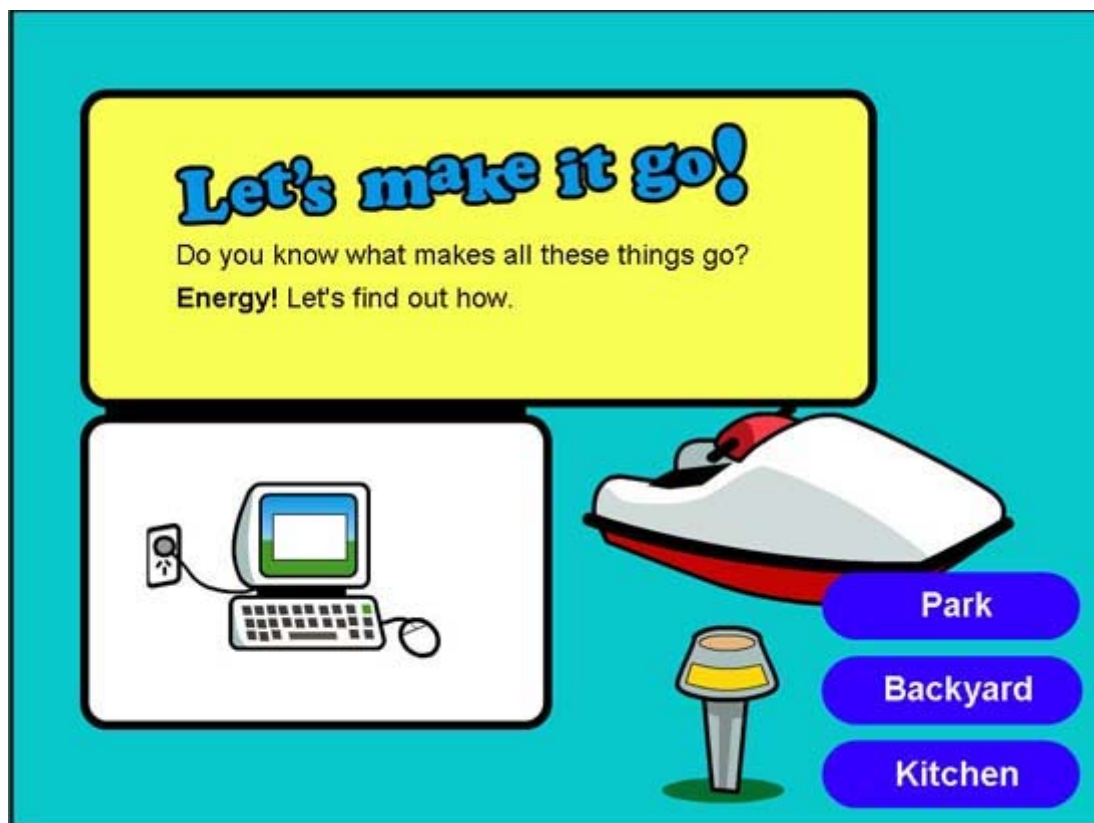
These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Energy and change

The Energy and change learning objects released to date are grouped into the following series.

Let's make it go (Years P–1)

The Let's make it go series examines what it is that 'powers' everyday objects in everyday environments.



Learning objects	LO ID	Years
Let's make it go: at the park	847	P–1
Let's make it go: backyard	953	P–1
Let's make it go: in the kitchen	954	P–1
Let's make it go 🎮	955	P–1

Students are offered a number of alternatives such as sun, wind, water, batteries, electricity, gas and petrol as they investigate each object and choose the most appropriate energy source for each. Students are rewarded with the animation of making the object 'go'.

Let's make it go: at the park

Using the park environment and objects easily associated with this environment, such as barbecues, boats and sprinklers, students are guided towards each object and introduced to their different types of power sources.

Let's make it go: backyard

Using a home backyard and objects easily associated with this environment, such as a drill, mower and family car, students are guided towards each object and introduced to their different types of power sources.

Let's make it go: in the kitchen

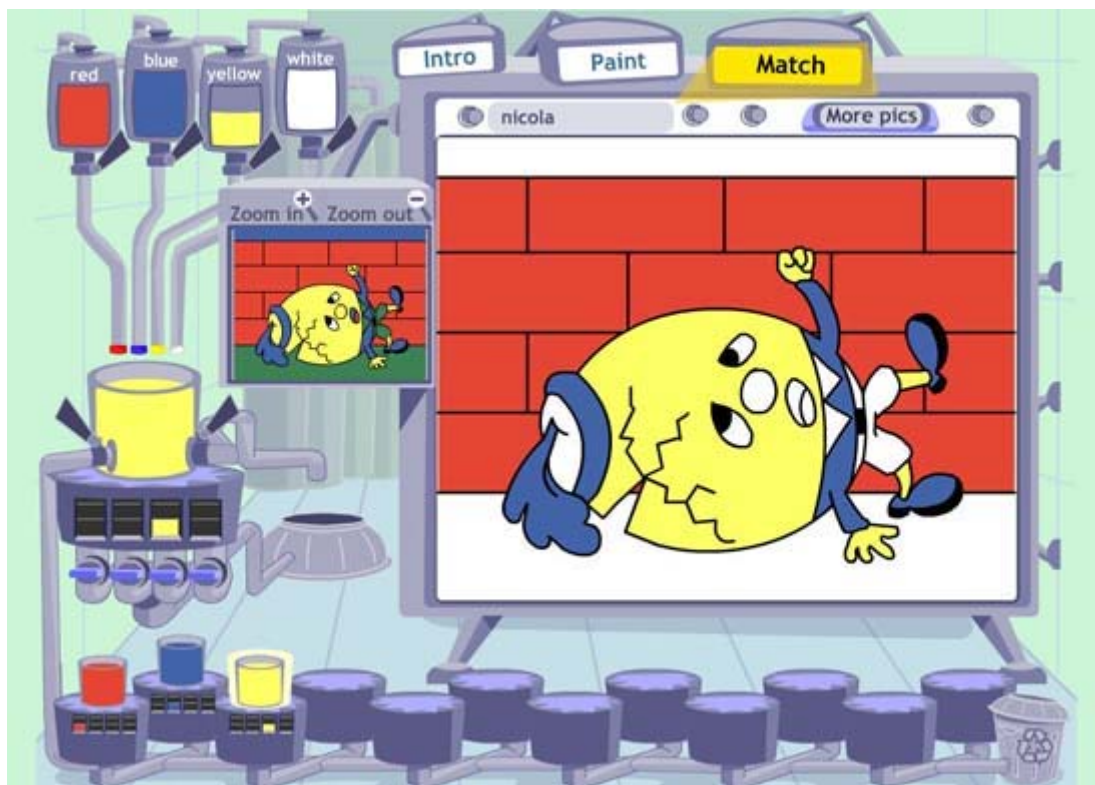
Using the kitchen and objects easily associated with this environment, such as a dish washer, oven, refrigerator and radio, students are guided towards each object and introduced to their different types of power sources.

Let's make it go

This is an aggregated learning object combining the three other learning objects.

Mixing colours (Years P–2)

The Mixing colours series is designed to help students understand mixing primary colours to create new colours. Using the mixing machine, students are able to add different volumes of paints to create colours that they can then use to paint predefined pictures.



Learning objects	LO ID	Years
Mixing colours: paint	1116	P–2
Mixing colours: match	1117	P–2
Mixing colours 🧩🧩🧩	686	P–2

Mixing colours: paint

Students use the mixing machine to mix primary colours to form different colours. Students can then select a picture from predefined outlines of varying complexity and paint it using the colours they have created.

Mixing colours: match

Students select a picture and use the mixing machine to create colours to match those in the selected picture. They then paint a replica of their selection. There are three levels of difficulty and students are able to print out their pictures.


Mixing colours

This is an aggregated learning object combining the two other learning objects.

Pushing and pulling (Years P–3)

The Pushing and pulling series is all about force for junior scientists. Students use non-standard labour units, in the form of monkeys, to help move recently arrived animals to the zoo.



Learning objects	LO ID	Years
Pushing and pulling: push or pull?	1120	P–1
Pushing and pulling: how much force?	1121	P–2
Pushing and pulling: zoo move	1122	P–3
Pushing and pulling 	700	P–3

Pushing and pulling: push or pull?

Students discover the difference between 'push' and 'pull' as they are asked to move four small animals, of similar mass across the bridge using 'monkey power'. Monkeys are selected from their perch in the tree. If the student is asked to push the animal, they must place the monkey behind the cart. To pull the animal across, they need to place the monkey in front of the cart.

Pushing and pulling: how much force?

The animals to be moved are of different sizes and therefore different masses. To move them will require different amounts of force. Students need to move the animals using the correct number of monkeys – too few and the cart can't be moved, too many monkeys leads to a crash! Luckily, the number of monkeys available is more than will ever be needed.

Pushing and pulling: zoo move

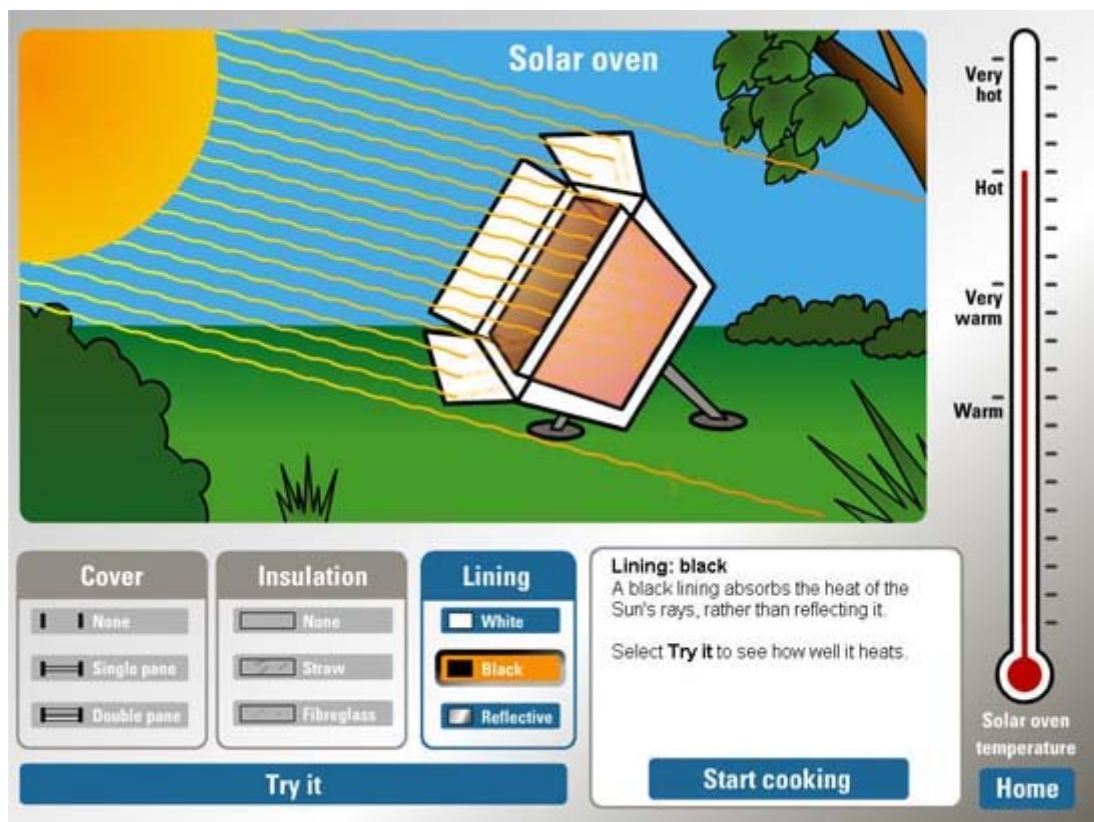
There is a finite pool of monkeys available. Using too few monkeys will mean that the cart will not be pushed across successfully. Using too many will mean that the cart will crash and there won't be enough monkeys to get all the animals across. 'Pushing and pulling' is a challenging puzzle about force and mass.

Pushing and pulling

This is an aggregated learning object combining the three other learning objects.

Energy from the Sun (Years 3–5)

The Energy from the Sun series gives students the opportunity to explore the use of solar energy for cooking.



Learning objects	LO ID	Years
Energy from the sun: design a solar cooker	1140	3–5
Energy form the sun: design a solar oven	1141	3–5
Energy from the sun: design a solar cooker and start cooking	848	3–5
Energy from the sun: design a solar oven and start cooking	1142	3–5
Energy from the sun 🧩	956	3–5

Energy from the sun: design a solar cooker

Students design a solar cooker by selecting various characteristics for its shape, direction and surface. They can test each of the variables to determine the heat generated by the cooker when powered by the Sun.

Energy from the sun: design a solar oven

Students design a solar oven by selecting various characteristics for its cover, insulation and lining. They can test each of the variables to determine the heat generated by the oven when powered by the sun.

Energy from the sun: design a solar cooker and start cooking

Students cook food in a solar cooker. By selecting the design settings for the cooker, students are able to find the best temperature needed to cook food such as soup, chicken or fish.

Energy from the sun: design a solar oven and start cooking

Students cook food in a solar oven. By selecting the design settings for the oven, students are able to find the best temperature needed to cook food such as chicken, pizza or lasagna.

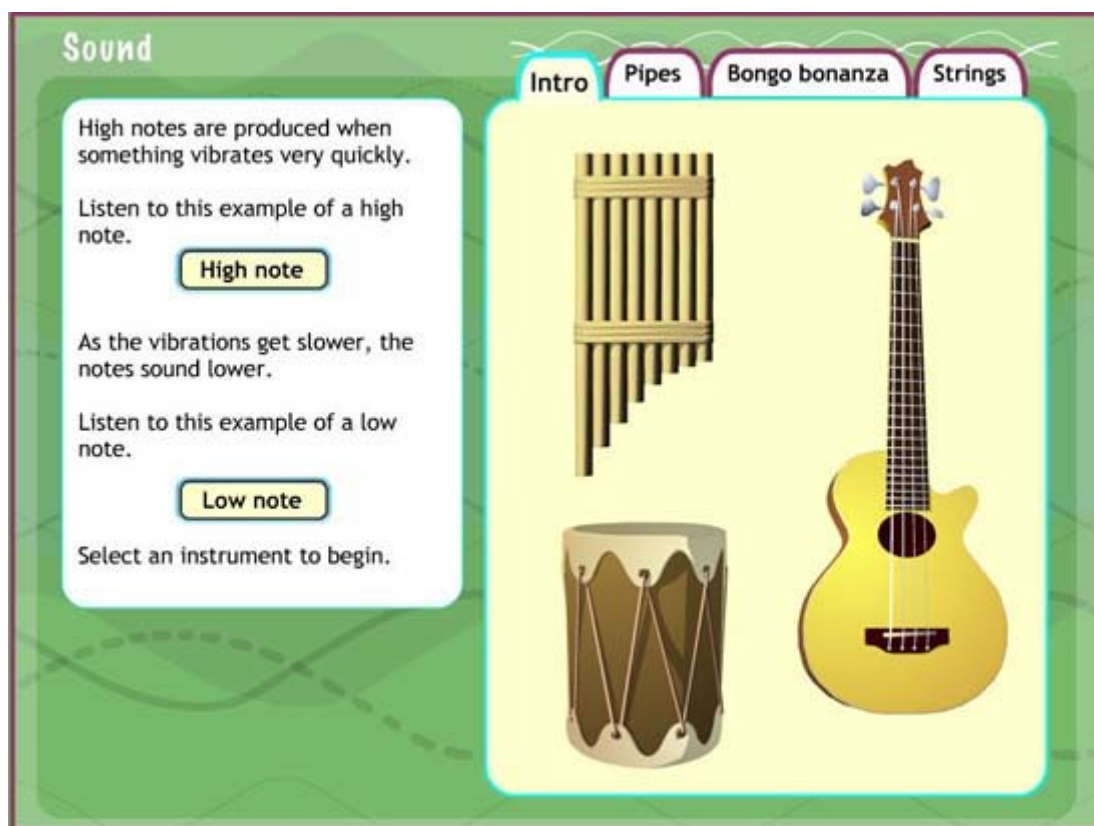
Energy from the sun


This is an aggregated learning object combining the four other learning objects.

Sound (Years 3–6)

The Sound series introduces students to some basic concepts relating to sound, including:

- a vibrating object sets the air vibrating, which is heard as sound
- the faster the vibration, the higher the sound.



Learning objects	LO ID	Years
Sound: strings	2538	3–6
Sound: bongo bonanza	2539	3–6
Sound: pipes	2540	3–6
Sound 	2536	3–6

Virtual musical instruments are used to illustrate the concept of sound being created by vibration. Students explore how sound, in this case musical notes, alters when they manipulate variables, such as string length and tension.

Sound: strings

Using a stringed guitar instrument, students investigate the impact of different variables such as string thickness and tension. Frets are also introduced to demonstrate the change in resultant note due to shortening the string. This structured investigation is supported by a series of questions to guide the user.

Sound: bongo bonanza

Using a bongo drum, students investigate the impact of different variables, such as drum size and skin tension, on the resultant sound. This structured investigation is supported by a series of questions to guide the user.

Sound: pipes

Using pan pipes, students investigate the impact of different variables, such as pipe length and width, on the resultant note played. This structured investigation is supported by a series of questions to guide the user.

Sound

This is an aggregated learning object combining the three other learning objects.

Sound: thunderstorm (Years 3–6)

Using the context of thunder and lightning, this learning object introduces the concept that sound and light travel at different speeds.



Learning objects	LO ID	Years
Sound: thunderstorm	2537	3–6

The 'Sound: thunderstorm' learning object explains what lightning and thunder are and introduces students to a simple method of estimating the speed that sound travels through the air. Students use a stopwatch to take measurements and then, using the data they collect, make estimations of the speed the sound is travelling.

Finally, the learning object establishes that the time delay between lightning and thunder is a guide to how far away a lightning strike occurs.

Steady ships (Years 3–6)

The Steady ships series introduces students to the concept of stability and the science of the centre of gravity. Using the context of a cargo ship students are asked to load containers so that weight is distributed evenly, the centre of gravity is low and most importantly that the centre of gravity does not move outside the base of boat when the ship sails. As centre of gravity has both vertical and horizontal considerations, a range of boat types (such as wide and tall) have been used to challenge students.



Learning objects	LO ID	Years
Steady ships: load similar weights	1495	3–6
Steady ships load different weights	1496	3–6
Steady ships: add similar weights	1498	3–6
Steady ships: add different weights	1499	3–6
Steady ships 🧩	1494	3–6

Steady ships: load similar weights

Using the ship loading metaphor students are provided with cargo items of similar weight at this foundation level.

Steady ships: load different weights

'Steady ships: load different weights' further challenges students by introducing greater variations in the cargo items that the students need to load.

Steady ships: add similar weights

In this scenario students have new elements (a car, yacht or truck), which have an unknown weight, so students must carefully analyse the weights that they are adding to best balance the ship. In this learning object students are provided similar weights to help scaffold into more difficult examples in the more complex learning objects.

Steady ships: add different weights

Students are challenged with unknown elements (a car, yacht or truck). However, this learning object uses cargo boxes of greater weight variance to challenge students.

Steady ships

This is a single aggregated learning object combining the four other learning objects.

Jet force (Years 4–6)

Based around a frictionless disc, the Jet force series enables students to investigate the results of applying a force to an object. The disc has several slots on its back to which jet forces can be attached by students who then shoot for goal. Vector diagrams showing the result of each force assist students to determine the number of forces and the position they must go in to achieve success.



Learning objects	LO ID	Years
Jet force: training	1113	4–6
Jet force: match	1114	4–6
Jet force: championship	1115	4–6
Jet force 🧩	685	4–6

Jet force: training

Before beginning anything, some training is always helpful. In 'Jet force: training' students begin by applying just one force to the disc, in the correct slot, to get the disc in the goal. Once they have that mastered, they move on to using two, and finally three, forces to get the disc into the goal.

Jet force: match

Students are awarded points based on their success at shooting goals. Apply the correct number of forces to the disk in the correct place, and a goal, plus points, is guaranteed. Miss the goal, and watch those points dwindle.

Jet force: championship

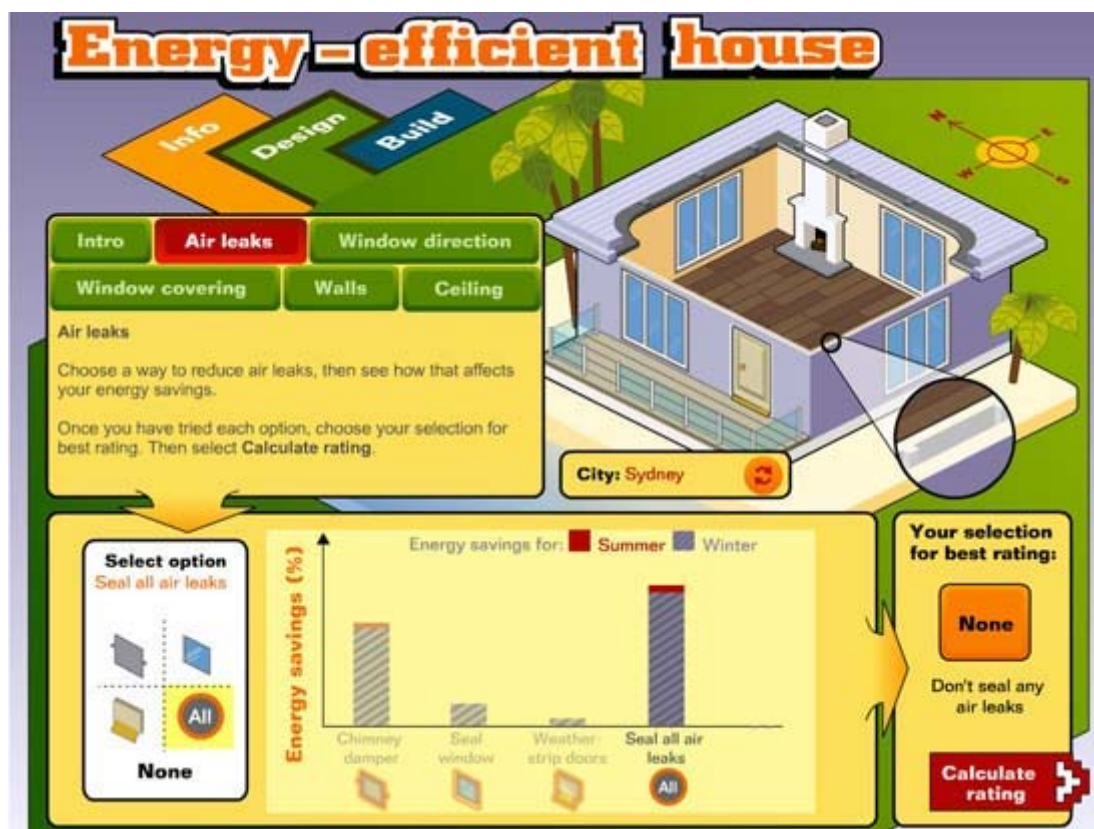
Students challenge a friend to see who is best able to combine forces and score a goal.

Jet force

This is an aggregated learning object combining the three other learning objects.

Energy-efficient house (Years 4–6)

In the Energy-efficient house series students take on the role of a designer selecting the types of materials to use in the construction of houses in different climatic regions in order to make them energy-efficient. Through this interaction, students identify materials and design factors that maximise energy efficiency of a building for a given climate.



Learning objects	LO ID	Years
Energy-efficient house: information	1148	4–6
Energy-efficient house: explore design	1149	4–6
Energy-efficient house: build for performance	1150	4–6
Energy-efficient house: build for value	1151	4–6
Energy-efficient house 🏠	895	4–6

Energy-efficient house: introduction

Students are introduced to the concept that air always flows from a hot area to a cold area. They are provided with information that will help them make energy-efficient choices in the design and construction of a house. This includes air leaks (from gaps under doors and windows), the types of insulation used for walls and ceilings, and the impact of double glazing windows.

Energy-efficient house: explore design

As an energy-efficient house designer, students decide in which city they wish to build a house. They then make choices about the type of insulation materials, window coverings and window directions that should be used in the construction of their house. They are then able to test the energy efficiency of the house.

Energy-efficient house: design for performance

Students are challenged to build the most energy-efficient house they can. The house they build will be given an energy efficiency rating comparing it to a house that has no insulation. Students will need to consider such things as window direction, the types of window coverings to use and what types of materials to build walls from.

Energy-efficient house: design for value

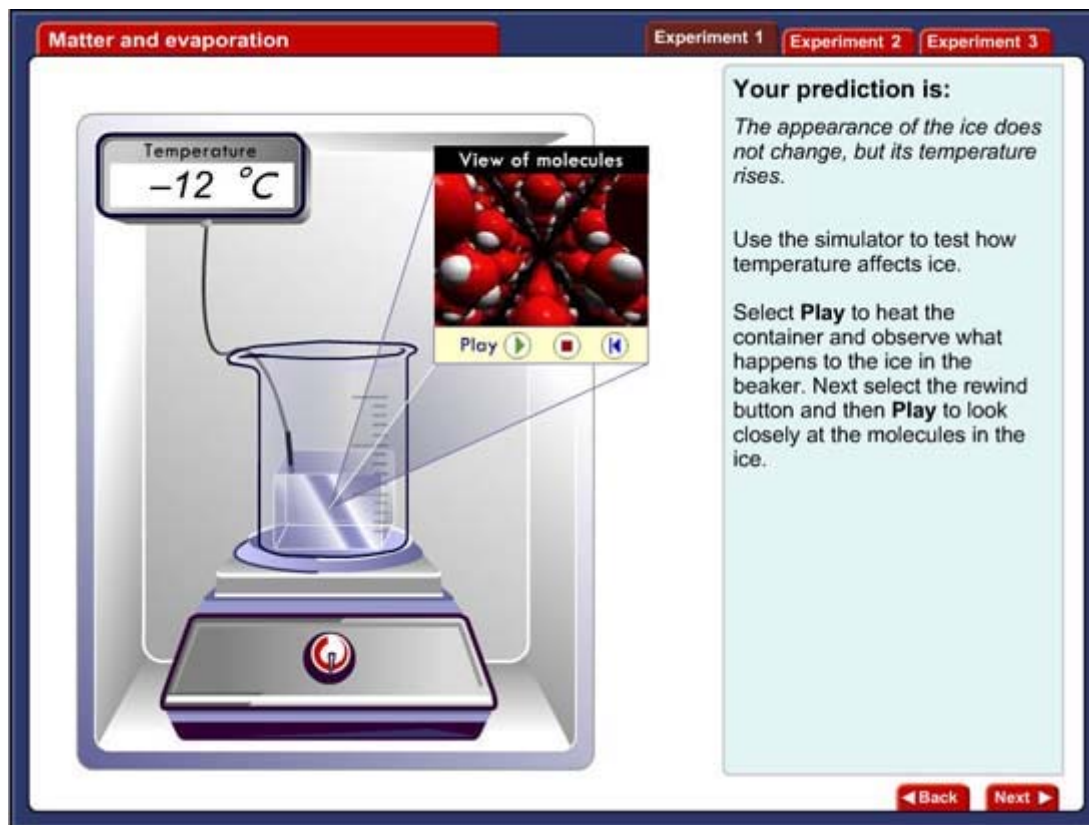
Students are challenged to build an energy-efficient house that will save them the most in energy costs over 20 years. Each choice students make (for example the type of insulation) will be displayed with an associated cost. The costs are totalled and the house costs are compared to the costs of a house that has no insulation. Students are then able to see a calculation comparing the cost savings after 20 years.


Energy-efficient house

This is an aggregated learning object combining the four other learning objects.

Matter and evaporation (Years 5–6)

The Matter and evaporation series enables students to experiment with the transformation of water to gain an understanding of the relationship between temperature, molecular speed and states of matter. Students predict the outcome of each investigation, and then are able to examine the outcome at a molecular level. Feedback is provided on the accuracy of their predictions.



Learning objects	LO ID	Years
Matter and evaporation: below zero	1491	5–6
Matter and evaporation: solid to liquid	1492	5–6
Matter and evaporation: liquid to gas	1493	5–6
Matter and evaporation 	1490	5–6

Matter and evaporation: below zero

By heating ice to -1°C in a virtual experiment, students discover the relationship between temperature and the molecular speed of ice. They discover that as the temperature rises the ice molecules vibrate faster, but that they remain bonded together as a solid.

Matter and evaporation: solid to liquid

By heating ice to $+10^{\circ}\text{C}$ in a virtual experiment, students discover the relationship between temperature and the molecular speed of ice. They discover that when the temperature reaches 0°C the molecules vibrate so fast that they break their solid structure bond and ice starts to melt.

Matter and evaporation: liquid to gas

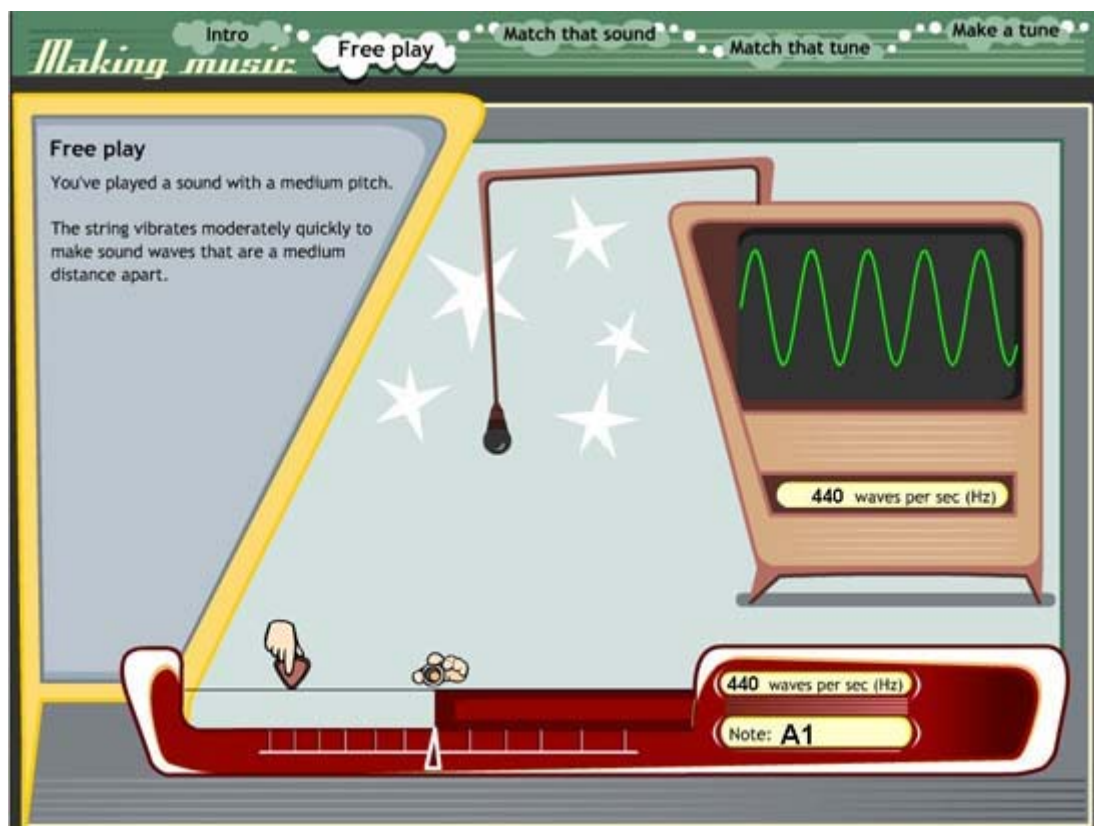
By heating water to over $+100^{\circ}\text{C}$ in a virtual experiment, students discover the relationship between temperature, change of state and the molecular speed of water. Students' discover that as the temperature reaches boiling point, the molecules vibrate so fast that they completely break free and float around. At this point the water changes state to become a gas.

Matter and evaporation

This is an aggregated learning object combining the three other learning objects.

Making music (Years 5–6)

The Making music series introduces students to the science behind sound. Students pluck a virtual stringed instrument and 'see' the sound waves that are made on a simplified oscilloscope. They have the opportunity to explore freely as well as the challenge of matching sounds or tunes.



Learning objects	LO ID	Years
Making music: free play	1193	5–6
Making music: match that sound	1194	5–6
Making music: match that tune	1195	5–6
Making music: make a tune	1196	5–6
Making music 🎵	1192	5–6

Making music: free play

Students step through a clearly explained introduction to the science of sound and then are able to experiment freely with the virtual stringed instrument. Students explore the relationships between string length, musical pitch and wave frequency. They are able to change the length of the string and 'see' the results.

Making music: match that sound

Students are challenged to listen to a sound, look at the wave pattern it makes on the oscilloscope and then see if they can make the same sound on the stringed instrument. There are three levels of difficulty in this learning object, and, as students progress, they have fewer chances to get the correct answer.

Making music: match that tune

Students are challenged to analyse, and then identify tunes made up of three individual sounds displayed on an oscilloscope. Students then select the sound wave pattern that matches the tune. To help them in their selection, students are able to experiment with patterns of sounds on the stringed instrument.

Making music: make a tune

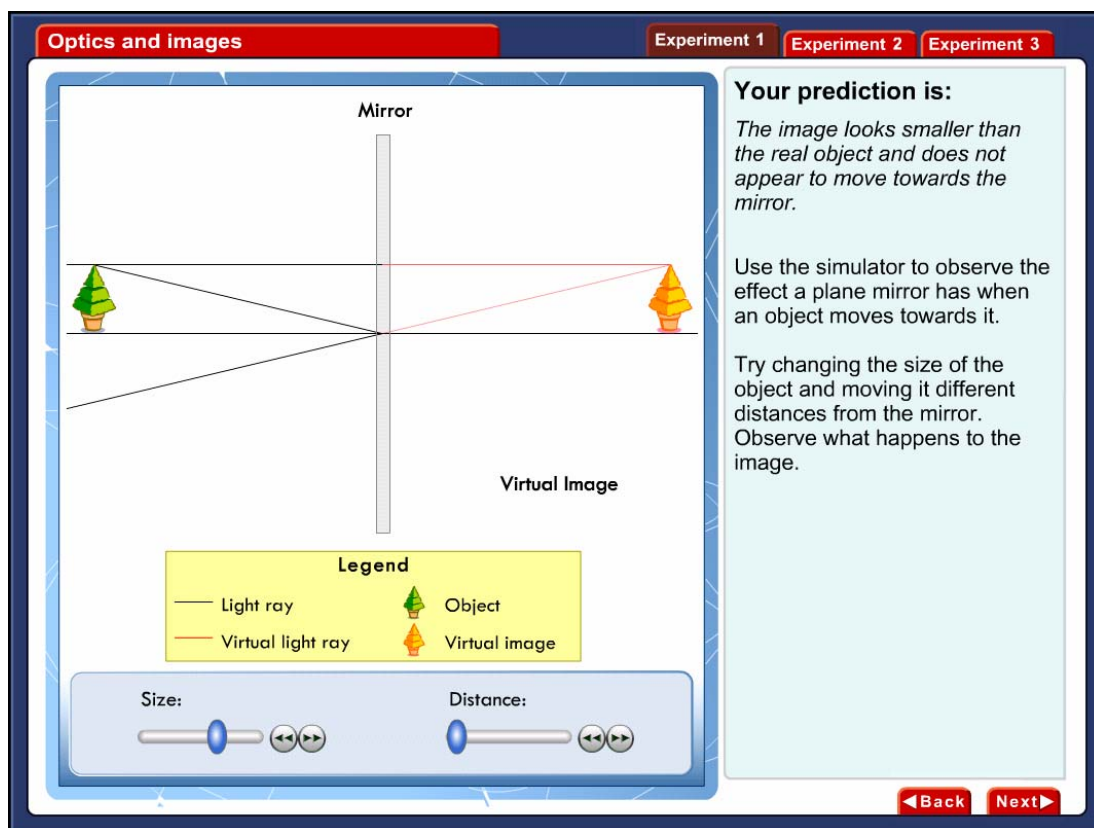
Students are able to record a tune of their own choice making long and short sounds on the stringed instrument by changing the note length. They are then able to play back the tune and see the wave patterns they have made. Students are also able to copy tunes such as 'row, row, row your boat' and 'jingle bells'.

Making music

This is an aggregated learning object combining the four other learning objects.

Optics and images (Years 5–6)

The Optics and images series enables students to experiment with lenses and mirrors discovering how images are reflected, magnified and projected. Students choose between two hypotheses as they start each investigation. Simulations are accessible for further investigation after feedback has been given.



Learning objects	LO ID	Years
Optics and images: plane mirrors	1487	5–6
Optics and images: curved mirrors	1488	5–6
Optics and images: lenses	1489	5–6
Optics and images	1483	5–6

This series contains non-TLF content. See Acknowledgements in the learning objects.

Optics and images: reflection

Students interact with an animated model that allows them to change the position and size of an object and see the results of the image reflection in a mirror. Through experimentation, they are able to see the effect this has on the position and size of the virtual (reflected) image. They are also able to see the corresponding light ray and virtual light rays. As a result of this interaction they are able to see that the virtual image always appears to be the same distance from the mirror as the object.

Optics and images: magnification

Students interact with an animated model that allows them to change the curvature of a convex mirror. Through experimentation, students are able to see the effect this has on the size of the virtual image that is reflected in the convex mirror. They are also able to see the corresponding light rays and virtual (reflected) light rays. As a result of this interaction they are able to see that an image changes size depending on the type of mirror.

Optics and images: projection

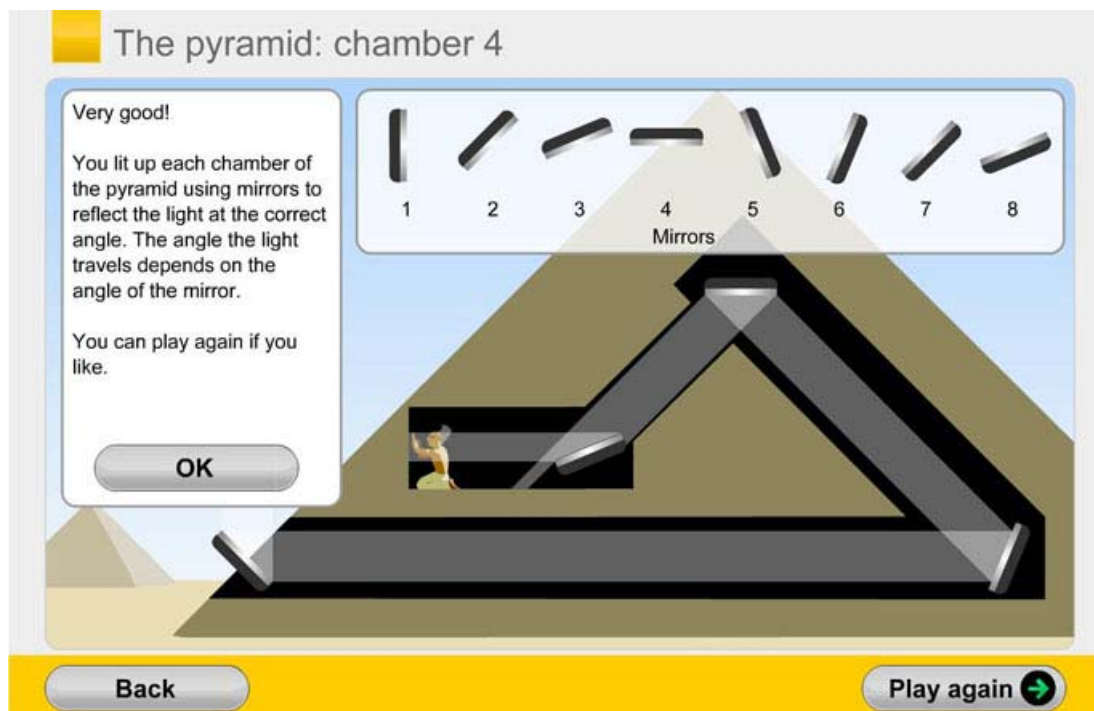
Students are able to explore what happens to an image when it passes through different lenses. They interact with an animated model that allows them to choose a convex or concave lens and then manipulate its curvature. Through experimentation, students see that a real image can be created using a convex lens and this image can be projected onto a screen.

Optics and images

This is an aggregated learning object combining the three other learning objects.

Light and reflection (Years 5–6)

In the Light and reflection series students explore the concepts of light and reflection in a range of different contexts.



Learning objects	LO ID	Years
Light and reflection: light rays: seeing through walls	4604	5–6
Light and reflection: light rays: shadow animals	4605	5–6
Light and reflection: light rays 🧩	2041	5–6
Light and reflection: using mirrors: the forest	4153	5–6
Light and reflection: using mirrors: the pyramid	4155	5–6
Light and reflection: using mirrors 🧩	2042	5–6
Light and reflection: reflecting off surfaces	2043	5–6
Light and reflection: under the spotlight	2044	5–6

Light and reflection: light rays: seeing through walls

Students rotate concentric walls until gaps in the walls are aligned and light can travel out to an observer. Through a series of increasingly complex tasks, students record that light always travels in a straight line.

Light and reflection: light rays: shadow animals

Students select from a range of shapes and then position the shape between a light source and a screen to match a shadow animal. Through a series of tasks that progressively increase in difficulty students understand that light travels in a straight line and that a shadow is caused when light is partially blocked.

Light and reflection: light rays

This is an aggregated learning object combining 'Light and reflection: light rays: seeing through walls' and 'Light and reflection: light rays: shadow animals'.

Light and reflection: using mirrors: the forest

Using the light from the headlights of his truck, students help Denis find animals at night by positioning a mirror to direct the beam of light. They must correctly position the mirror to reflect light at a suitable angle. Initially students are able to vary the angle of the mirror, then

must predict which fixed mirror will achieve the desired angle. From this experimentation students determine that light always travels in a straight line.

Light and reflection: using mirrors: the pyramid

Students light the way for a scribe to see inside a pyramid by correctly predicting and positioning mirrors that will reflect a beam of sunlight at a suitable angle. Through this exploration, and a series of tasks that increase in difficulty, students notice that the light always travels in a straight line, and gain an understanding of the way in which light is reflected by plane mirrors.

Light and reflection: using mirrors

This is an aggregated learning object combining 'Light and reflection: using mirrors: the forest' and 'Light and reflection: using mirrors: the pyramid'.

Light and reflection: reflecting off surfaces

Initially, the analogy of balls bouncing off surfaces of different roughness is used to explain the reflective properties of different materials. Students observe the way in which the balls bounce in different directions and order the surfaces in increasing roughness. Students learn that the amount of scatter can be used as an indicator of how rough the surface is. Using this knowledge, students then observe light reflecting off surfaces of varying roughness. They infer the roughness of that surface based on the amount of light scatter, enabling them to place these surfaces in increasing order of roughness.

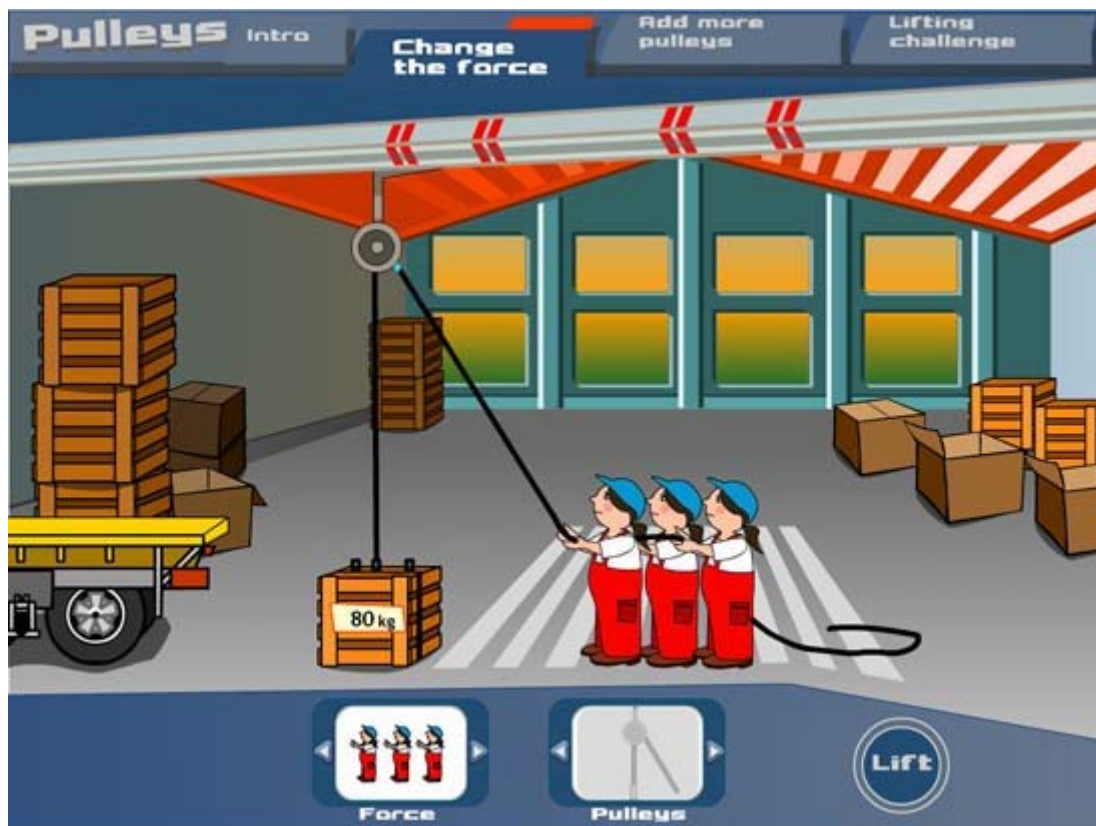
To confirm students understanding they must choose a good reflector from a selection of objects to help rescue a castaway.

Light and reflection: under the spotlight

Initially students observe that the shape of a reflector, concave, flat or convex, alters a reflected beam of light. By tracing individual light rays the link between angle of incidence and angle of reflection is demonstrated with the application of this to stage lighting being illustrated. In the final activity, students have to follow a simplified lighting diagram to set the stage lights as a rock group plays.

Pulleys (Years 5–8)

The Pulleys series enables students to explore the relationship between mass, force, distance and work. They solve lifting problems using combinations of force and pulley numbers. The setting for this series is a warehouse where the students are helping workers lift crates onto a truck. The results of the students' efforts are recorded in a data table.



Learning objects	LO ID	Years
Pulleys: change the force	1199	5–8
Pulleys: add more pulleys	1200	5–8
Pulleys: lifting challenge	1201	5–8
Pulleys 🧩	1198	5–8

Pulleys: change the force

Students assess the weight of each crate and then determine how much force (how many workers) are needed to lift the crate.

Pulleys: add more pulleys

Students assess the weight of each crate and then determine the minimum number of pulleys needed for the workers to lift the crate.

Pulleys: lifting tasks

Students assess the weight of each crate and use different strategies to lift the crates. Sometimes they must change the number of pulleys, sometimes the force (number of workers) and sometimes both.

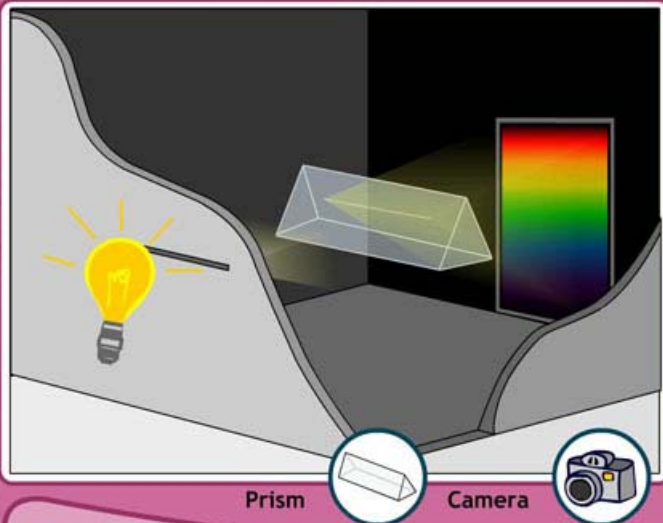
Pulleys



This is an aggregated learning object combining the three other learning objects.



Additive colour (Years 5–8)

The Additive colour series enables students to explore the different mixture of colours emitted by a range of light sources and the range of colours produced by combining different ratios of the three primary additive colours.

Additive colour: the colour of light




Light

Task 2: Light bulb

Now select the glass prism again and take a photo of the colour spectrum from the light bulb.

Compare the two spectrums. Of the two spectrums, the light bulb's has:

- ☐ Exactly the same amounts of each colour
- ☐ Less red and orange; more blue and green
- ☐ Less blue and green

Learning objects	LO ID	Years
Additive colour: the colour of light	2542	5–8
Additive colour: combining coloured light	2543	5–8
Additive colour 	2541	5–8

In the learning objects, students use interactive tools for comparing light sources, visible spectrum components and the result of mixing colours. Students predict the result when additive colours are mixed. Students learn that mixing coloured lights (an additive process) does not produce the same result as mixing paint colours (a subtractive process).

The learning objects test understanding of key concepts through multiple-choice questions.

Additive colour: the colour of light

Students use a variety of light sources and take pictures of the resultant spectrum so that a comparison can be made. The learning object introduces the concept that white light is made up of many colours.

Additive colour: combining coloured light

Students use the three main colour light sources in different combinations to examine the effect on white. Students are also asked to consider some of the technologies that might use additive light.

Additive colour

This is an aggregated learning object combining the two other learning objects.

96

© Curriculum Corporation 2007

APRIL 2007

Subtractive colour (Years 5–8)

The Subtractive colour series enables students to investigate that white light is made up of coloured light and coloured filters selectively absorb colours.

Subtractive colour: objects
Objects

Task 1: Yellow filter and red tomato

Why do you think the tomato still looks red?

- ☐ The yellow filter makes no difference to the light passing through it.
- ☐ The yellow filter absorbs only blue light, so the red and green light pass through. The tomato absorbs the green light and reflects the red light.
- ☐ The tomato will appear red with any light.

Learning objects	LO ID	Years
Subtractive colour: objects	2780	5–8
Subtractive colour: spectrum	2544	5–8
Subtractive colour	2545	5–8

Using interactive tools, students identify that the three primary subtractive colours are magenta, cyan and yellow. They then predict the result when subtractive colours are filtered onto coloured objects and explore the range of colours produced by combining different ratios of the three primary subtractive colours.

The learning objects test understanding of key concepts through multiple-choice questions.

Subtractive colour: spectrum

After establishing that white light is made up of different colours, students predict and explore how the colours in white light can be split, absorbed and reflected by shining a white light through coloured filters (magenta, yellow and cyan) and a glass prism. Then using multiple combinations of the filters they investigate how filters absorb some colours and let others pass through.

Subtractive colour: objects

Students use different combinations of filters to absorb primary colours so they do not shine onto a given object. They then investigate what combinations of filters might be used to change a white object into a different colour. Students are also asked to consider some of the technologies that might use subtractive colours.

Subtractive colour

This is an aggregated learning object combining the two other learning objects.

Air pressure (Years 5–8)

In the Air pressure series students use an interactive particle model to explore the meaning and effects of air pressure.

Question 3
Turn up the heat in the air chamber.
Do the gauges change?

- ☐ The temperature goes up.
- ☐ The temperature goes down.
- ☐ The pressure goes up.
- ☐ The pressure goes down.
- ☒ The temperature and pressure go up.

Learning objects	LO ID	Years
Air pressure: particle model	2532	5–6
Air pressure: effect on objects	2533	5–6
Air pressure: measurement	2534	7–8
Air pressure: units	2535	7–8
Air pressure 🧩	2531	5–8

In each of the learning objects students use a simulator to demonstrate the particle model of a gas. The simulator allows students to adjust variables, observe results and measure effects, and tests understanding of key concepts through multiple-choice questions.

Air pressure: particle model

Using an air chamber to model the movement of particles, students investigate the speed and collisions of air particles with each other, the chamber wall and other objects in their path. Students examine the effects on the model when they change variables such as temperature, pressure and volume of the air chamber.

Air pressure: effect on objects

Using an air chamber to model the movement of particles, students investigate the effects of changing air pressure on objects such as a marshmallow. Students examine the effects on the objects when they change variables such as temperature, pressure and volume of the air chamber.

Air pressure: measurement

Using an air chamber to model the movement of particles, students investigate the effects of changing variables such as the temperature, pressure and volume of the air chamber. By watching the gauges, students can observe effects on temperature and pressure.

Air pressure: units

Using an air chamber to model the movement of particles, students use gauges to measure temperature and pressure and the effects of changing variables such as the temperature, pressure and volume of the air particles in the chamber.

Air pressure

This is an aggregated learning object combining the four other learning objects.

Sport shoes (Years 6–7)

The Sport shoes series provides opportunities for students to investigate the concept of ground reaction force, both through the practical example of sports shoes and from the perspective of a sports scientist. Students can make predictions, collect and analyse data and apply this for useful technological purposes.



Learning objects	LO ID	Years
Sports shoes: sole support	491	6–7
Sports shoes: sole support [no spoken instructions]	780	6–7
Sports shoes: shoe4u	492	6–7
Sports shoes: shoe4u [no spoken instructions]	781	6–7

Sports shoes: sole support

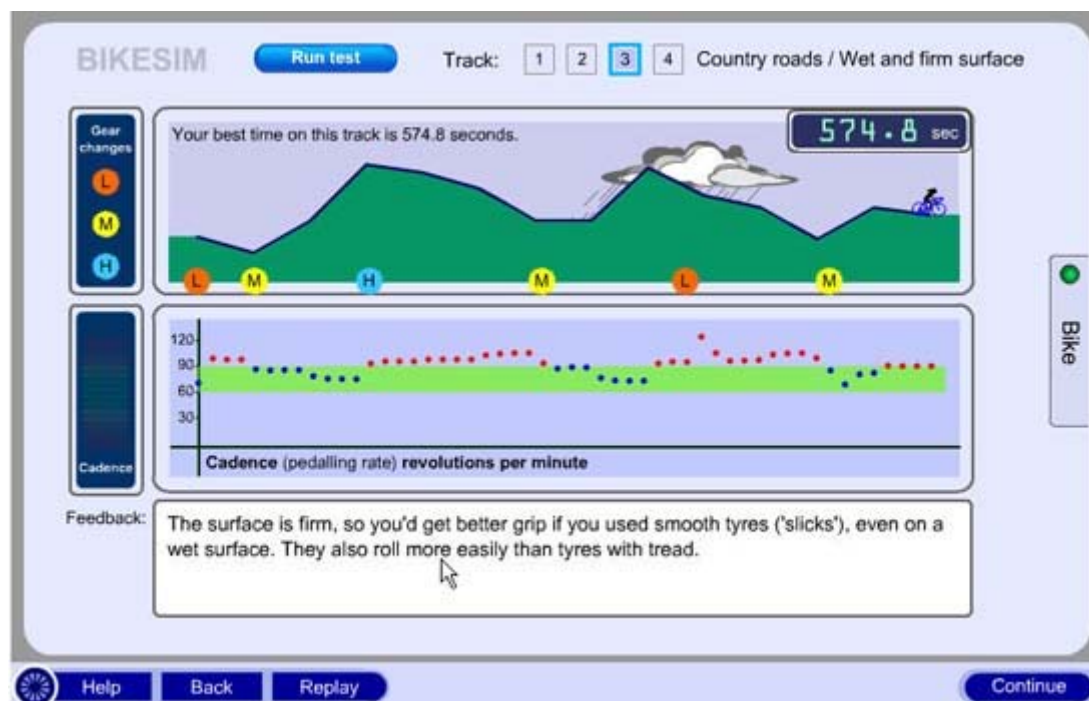
Students experience the outcome of two forces colliding. Sports shoes are used to demonstrate that the impact from the ground reaction force can be measured and managed through an understanding of the components of sports shoes and their purpose.

Sports shoes: shoe4u

Students experiment with the design of shoes for different sports, taking into account their requirements of particular sports and the properties of the shoe components.

Wild ride (Years 6–7)

In the Wild ride series students investigate some of the physical forces involved in riding a bicycle. Students investigate scientific principles and then test these principles in simulated bike-race time trials. Results of the tests are displayed and feedback provided.



Learning objects	LO ID	Years
Wild ride: get a grip	477	6–7
Wild ride: get a grip [no spoken instructions]	478	6–7
Wild ride: on a roll	479	6–7
Wild ride: on a roll [no spoken instructions]	480	6–7
Wild ride: in top gear	481	6–7
Wild ride: in top gear [no spoken instructions]	482	6–7
Wild ride: race day	483	6–7
Wild ride: race day [no spoken instructions]	484	6–7

'Wild ride: in top gear' and 'Wild ride: on a roll' contain non-TLF content. See Acknowledgements in the learning objects.

Wild ride: get a grip

Students investigate the role of friction in the performance of bicycle tyres. They test how the type of tread affects grip and speed, and choose tyres best suited to various track and weather conditions in simulated bike-race time trials. A notebook function also allows students to record observations and these can be printed.

Wild ride: on a roll

Students investigate the role of physical forces in how bicycle wheels work. They test how wheel size, tyre pressure, tread and load affect rolling resistance, and choose wheels best suited to various track and weather condition in simulated bike-race time trials.

Wild ride: in top gear

Students investigate how gears work and why you need them to ride a bicycle efficiently. They test how cog size affects speed and energy efficiency, and choose gears best suited to various track and weather conditions in bike-race time trials.


Wild ride: race day

It's race day. In order to get the fastest possible time, students select bike type, colour, wheel size, tyre tread and gear set and determine tactics to suit the race track and weather conditions.

Accelerate (Years 7–10)

The Accelerate series introduces students to the concepts of speed and acceleration. Students apply Newton's second law of motion to work out the acceleration needed in a series of challenges as they explore the relationship between acceleration, force, mass and friction. Students are transported to the year 2084 where they take on the role of an interplanetary cargo craft pilot. In this role they control the force of the craft under various conditions. They are able to increase or decrease the force at any time, tracking their progress on a velocity–time line graph. A chart of the results of investigations can be printed.



Learning objects	LO ID	Years
Accelerate: force	1189	7–10
Accelerate: mass	1190	7–10
Accelerate: friction	1191	7–10
Accelerate 	1188	7–10

Accelerate: force

Students control the craft's force settings in order to maintain constant acceleration as they fly through space.

Accelerate: mass

Students control the craft's force settings in order to maintain constant acceleration. However, when students take on cargo, the mass of the craft changes and they must adjust the force accordingly.

Accelerate: friction

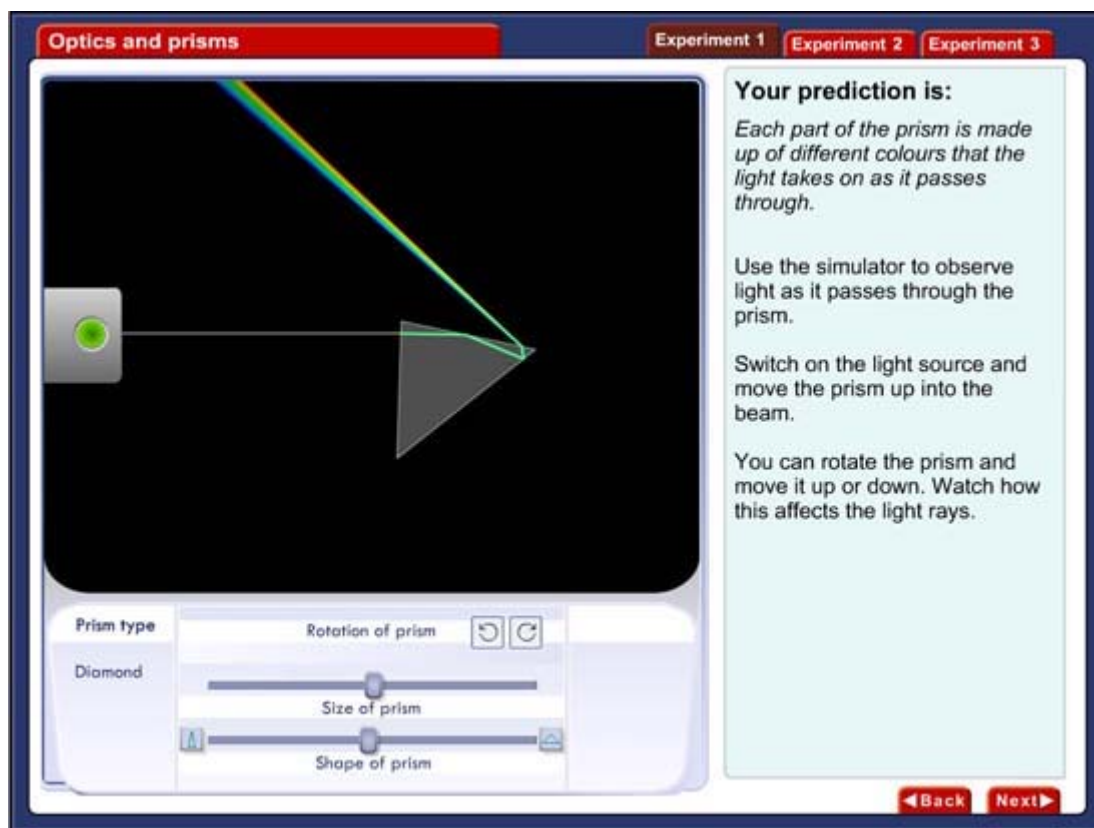
Students control the craft's force settings in order to maintain constant acceleration. However, they must adjust the force when the craft is affected by 'drag' (friction) when they pass through a cloud of gas.


Accelerate

This is an aggregated learning object combining the three other learning objects.

Optics and prisms (Years 8–10)

The Optics and prisms series introduces students to the principles of refraction and dispersion of light. The series enables students to experiment with prisms and light, splitting white light into the spectrum colours, changing the material a prism is made from and applying coloured filters to a white light source. Students choose between two hypotheses as they start each investigation. Simulations are accessible for further investigation after feedback has been given.



Learning objects	LO ID	Years
Optics and prisms: split light	1480	8–10
Optics and prisms: materials	1481	8–10
Optics and prisms: coloured light	1482	8–10
Optics and prisms 	1479	8–10

Optics and prisms: split light

Students are challenged to determine where the spectrum of colours that appear when white light is split, comes from. Students interact with an animated model of a prism and a white light source. They are able to rotate the prism as well as change its size and shape. Through this interaction, students discover that each of the colours that make up the white light bends at a different angle when they pass through the prism.

Optics and prisms: materials

Students are challenged to determine whether the same colour spectrum that appears when white light is split will be the same even if the prism is made of a different material. Students interact with an animated model of a prism choosing whether it is made of glass, flint glass or diamond. They are also able to rotate the prism as well as change its size and shape. Through this interaction, students discover that the same colours appear no matter which of the materials the prism is made from.

Optics and prisms: coloured light

Students are challenged to determine what effect a coloured light source has on the colours that result from splitting white light. Students interact with an animated model of a prism and a white light source placing different coloured filters in front of the white light. Students are then able to rotate the prism as well as change its size and shape taking note of the effect on the colour spectrum. Through this interaction, students discover that a coloured filter removes some colours of light from the spectrum.

Optics and prisms

This is an aggregated learning object combining the three other learning objects.

Glide (Years 9–10)

The Glide series provides opportunities for students to investigate the physical forces involved in hang-gliding. Students are able to modify a hang-glider's wingspan and camber shape and adjust the weight of the pilot, then test the glider's ability to fly successfully. Controls allow students to manage the test flight, and feedback is given.



Learning objects	LO ID	Years
Glide: meet the instructor	392	9–10
Glide: meet the instructor [no spoken instructions]	659	9–10
Glide: customise your hang-glider	394	9–10
Glide: customise your hang-glider [no spoken instructions]	660	9–10
Glide: take a flight	395	9–10
Glide: take a flight [no spoken instructions]	661	9–10
Glide: an interactive guide to hang-gliding 🧩	396	9–10
Glide: an interactive guide to hang-gliding [no spoken instructions] 🧩	658	9–10

'Glide: meet the instructor' and 'Glide: an interactive guide to hang-gliding' contain non-TLF content. See Acknowledgements in the learning objects.

Glide: meet the instructor

Students interview a hang-gliding instructor to discover why she likes to hang-glide, what hang-gliders are made from, how they fly and how to take off, steer and stay up in the air.

Glide: customise your hang-glider

Students customise and test a hang-glider. They select the pilot's weight, choose the correct wingspan for this weight, modify the camber shape and test for peak performance.

Glide: take a flight

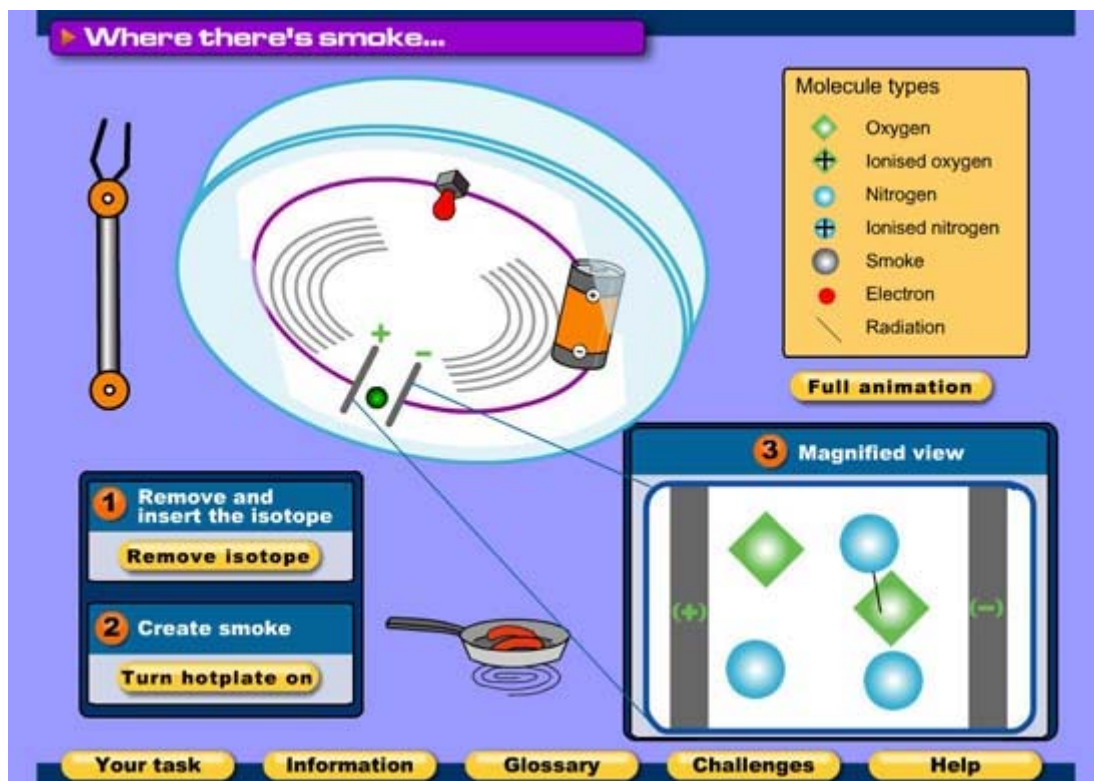
Students take their hang-glider on a test flight and fly it to a target zone. They can control the flight direction, roll and angle of attack. The altimeter shows height above sea level and the variometer indicates the climb or descent rate. Feedback is given on the success of their attempts.

Glide: an interactive guide to hang-gliding

This is an aggregated learning object combining the three other learning objects in a sequence.

Isotopes and radiation (Years 9–10)

The Isotopes and radiation series enables students to explore smoke, isotopes and radiation.



Learning objects	LO ID	Years
Where there's smoke	44	9–10
Check your ions	46	9–10
The alpha, beta, gamma of radiation	45	9–10
Isotopes and radiation 🇬🇧🇨🇦🇦🇺	75	9–10

Where there's smoke

Students explore how a smoke detector operates in a home safety scenario. A circuit diagram illustrates the role of an isotope in ionising the air within a circuit gap.

Check your ions

This learning object extends the activities contained in 'Where there's smoke'. Students test a range of isotopes for their suitability in the smoke detector.

The alpha, beta and gamma of radiation

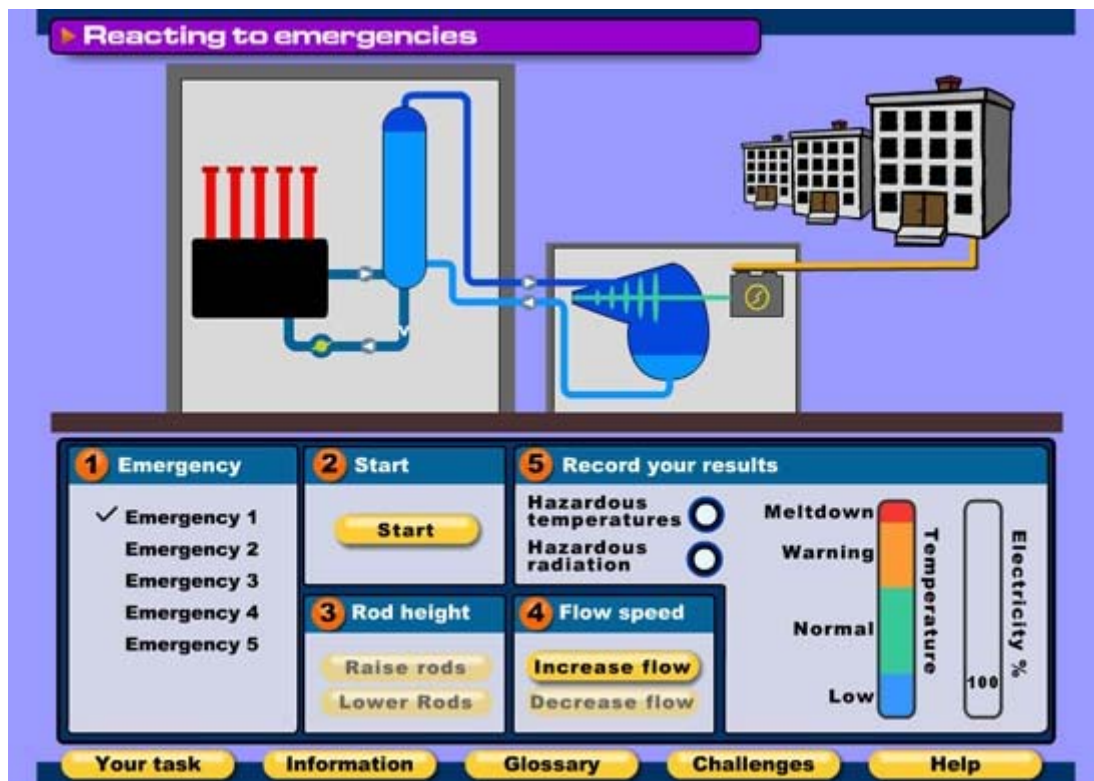
Students participate in a simulation of a radiation laboratory in which a Geiger counter is used to measure the alpha, beta and gamma radiation from a range of isotopes. Students test the absorption effects of various materials on the radiation emission levels.

Isotopes and radiation

This is an aggregated learning object combining the two other learning objects.

Nuclear power (Years 9–10)

The Nuclear power series enables students to explore various aspects of nuclear energy.



Learning objects	LO ID	Years
Fission control	47	9–10
Reacting to emergencies	48	9–10
Nuclear power 🎮	76	9–10

Fission control

Students first answer questions about how nuclear reactors work. They then proceed to operate simulated controls for a nuclear power reactor with the variables: fuel type, coolant type, coolant flow and position of control rods. The aim is to generate electricity without causing a meltdown.

Reacting to emergencies

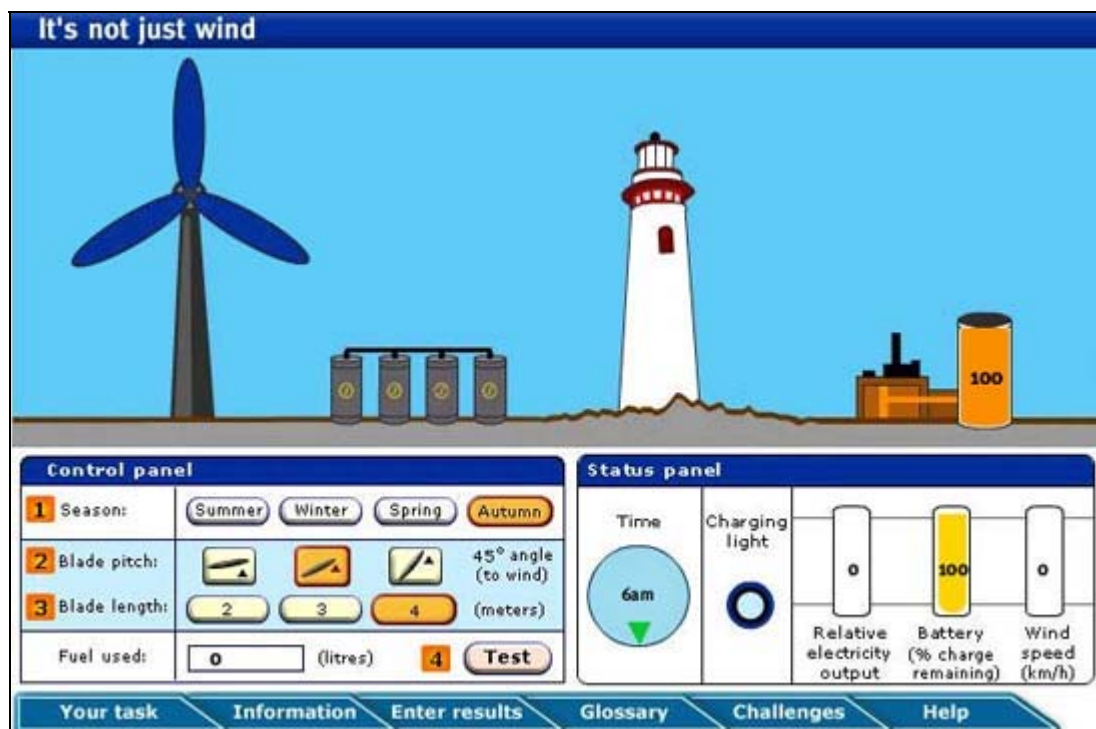
Students operate simulated controls for a nuclear power reactor. They regulate coolant flow and position of control rods as they respond to mechanical failures and other emergencies. The aim is to ensure a safe operation while avoiding a meltdown.


Nuclear power

This is an aggregated learning object combining the two other learning objects.

Wind power (Years 9–10)

The Wind power series enables students to explore the conversion of wind energy into electricity.



Learning objects	LO ID	Years
It's not just wind	49	9–10
Check your wind	50	9–10
Wind power 	77	9–10

It's not just wind

Students test design settings for a windmill that is to generate electric power for an island lighthouse. They set the angle and pitch of the windmill blades to suit wind speed for each season. They try to maximise energy efficiency of the windmill operation while minimising the back-up use of diesel fuel for power generation. They predict and test the setting that results in the minimum use of fuel over one year.

Check your wind

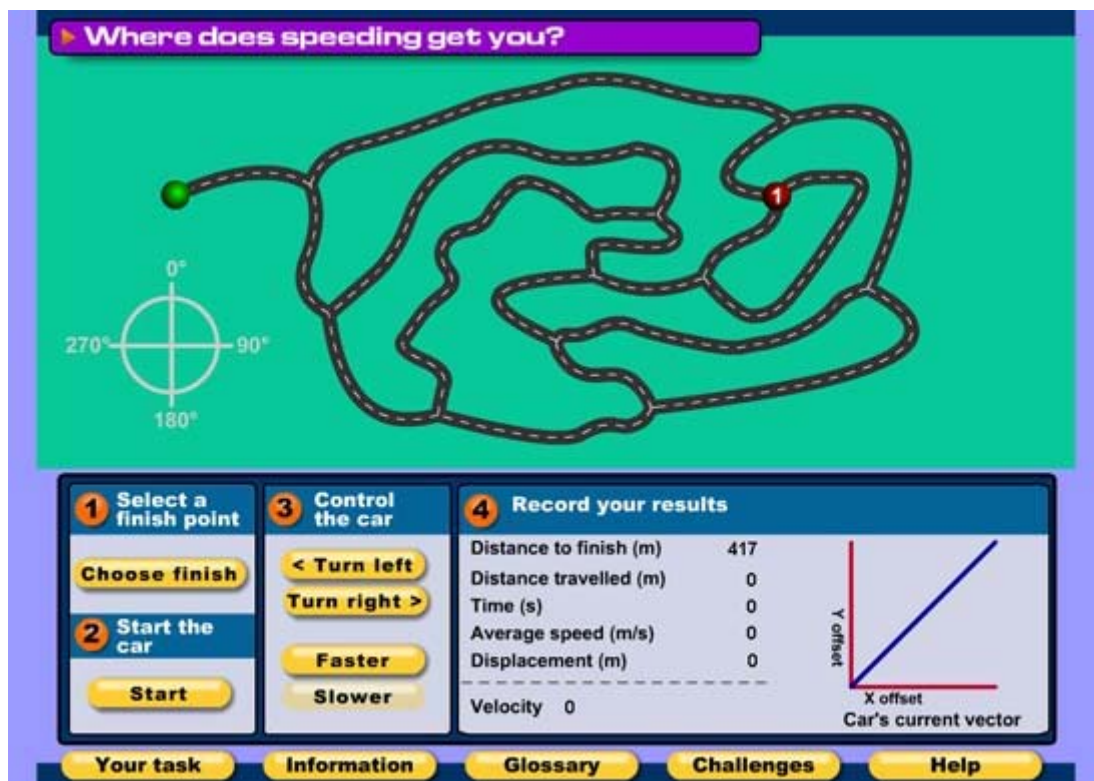
'Check your wind' extends the activities contained in 'It's not just wind'. Students are asked to determine the best locations in Australia and New Zealand for locating wind generators.


Wind power

This is an aggregated learning object combining the two other learning objects in a sequence.

Speed and direction (Years 9–10)

The speed and direction series enables students to explore the relationships between distance, time and speed.



Learning objects	LO ID	Years
Where does speeding get you?	53	9–10
Sea rescue	54	9–10
River currents	55	9–10
Speed and direction 	79	9–10

Where does speeding get you?

Students steer a rally car around a track, adjusting speed and direction. They can view a continuous readout of: distance travelled, time taken, speed, velocity, displacement angle and direction. Students record their results for each test run. They then explore the relationship between scalar and vector values.

Sea rescue

Students attempt to save a dog on a drifting boat before it collides with rocks by adjusting the course and speed of a rescue boat. Students explore relationships between angles, speed, distance and time, and learn how to express speed and direction as vector values.

River currents

Students direct a motorboat to moor beside a buoy in a river, adjusting boat speed and direction to allow for water current. They use trigonometry to calculate the relationships between angles, speed, distance and time. This is an advanced test of knowledge of vectors. Challenge questions extend these principles to a road setting.


Speed and direction

This is an aggregated learning object combining the three other learning objects in a sequence.

Speed and distance (Years 9–10)

The Speed and distance series enables students to explore the physics of motion.



Learning objects	LO ID	Years
It's a drag	51	9–10
Give me a brake	52	9–10
Speed and distance 	78	9–10

It's a drag

Students explore how a range of variables (vehicle speed, vehicle type, road surface type, weather conditions and tyre tread) affect the stopping distance of a vehicle when the brakes are applied.

Give me a brake

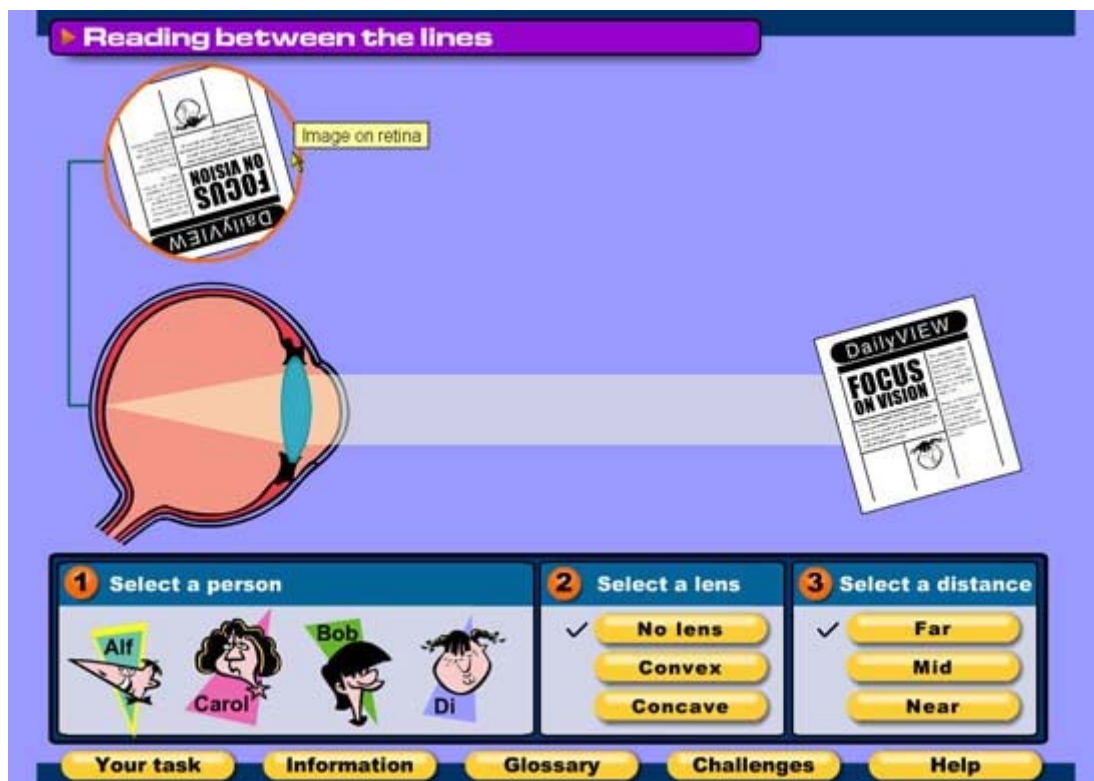
'Give me a brake' extends the activities in 'It's a drag'. Students predict and test how different vehicles and road conditions affect the length of a skid.

Speed and distance

This is an aggregated learning object combining the two other learning objects in a sequence.

Vision and lenses (Years 9–10)

The Vision and lenses series enables students to explore the basic relationships between several optical variables.



Learning objects	LO ID	Years
Far out lenses	56	9–10
Reading between the lines	57	9–10
Vision and lenses 🧐📖	80	9–10

Far out lenses

Students build a simple telescope for looking at the moon using two convex lenses. They adjust the focal lengths of the lenses and compare results in the viewfinder. They explore basic relationships between several variables such as focal length, position of objective lens, convexity, image inversion and lens size.

Reading between the lines

Students test the vision of four virtual people to diagnose common vision problems: myopia, hyperopia and presbyopia. They compare the effects of corrective lenses on reading at different distances and determine which lens type corrects the vision problem.

Vision and lenses

This is an aggregated learning object combining the two other learning objects in a sequence.

Seeing with sound (Years 9–10)

The Seeing with sound series enables students to experiment and explore aspects of sound using a range of highly interactive tools. Students adjust frequency, wavelength and amplitude settings and interpret graphically displayed information. Students also interpret data to determine the location, speed, and distance to an object using 'sound producers' and sound sensors.



Learning objects	LO ID	Years
Seeing with sound: sound lab tool	1301	9–10
Seeing with sound: sound lab tour	1302	9–10
Seeing with sound: sound lab quiz	1303	9–10
Seeing with sound: echo lab	1304	9–10
Seeing with sound: Doppler lab	1305	9–10
Seeing with sound 🧩	1306	9–10

Seeing with sound: sound lab tour

Students are introduced to wave and particle model representations of sound and are able to use them to answer questions about the relationship between waveform, wavelength, frequency and other properties of sound. Students are also able to draw upon additional information about frequency, wavelength and amplitude.

Seeing with sound: sound lab quiz

Students are 'quizzed' on their understanding of sound. Students are presented with information about a range of items such as drums, a hammer, a tuning fork and a sonar device. The properties (frequency, wavelength and amplitude) of each can be displayed, as well as the sound wave each makes. Based on this information students are asked a series of questions.

Seeing with sound: echo lab

Students are introduced to the concept of echo-location works. They are then able to interact with a simulator to test how an echo can be used to measure distance. They use the tool to time how long it takes to hear an echo and then answer a series of questions based on their observations.

Seeing with sound: Doppler lab

Students are introduced to the concept that sound waves can be used to locate things that are not visible to the human eye. Using a simulator tool students investigate how the Doppler Effect helps use an echo to work out how fast things are moving. Students then answer a series of questions based on their observations.

Seeing with sound: sound lab tool

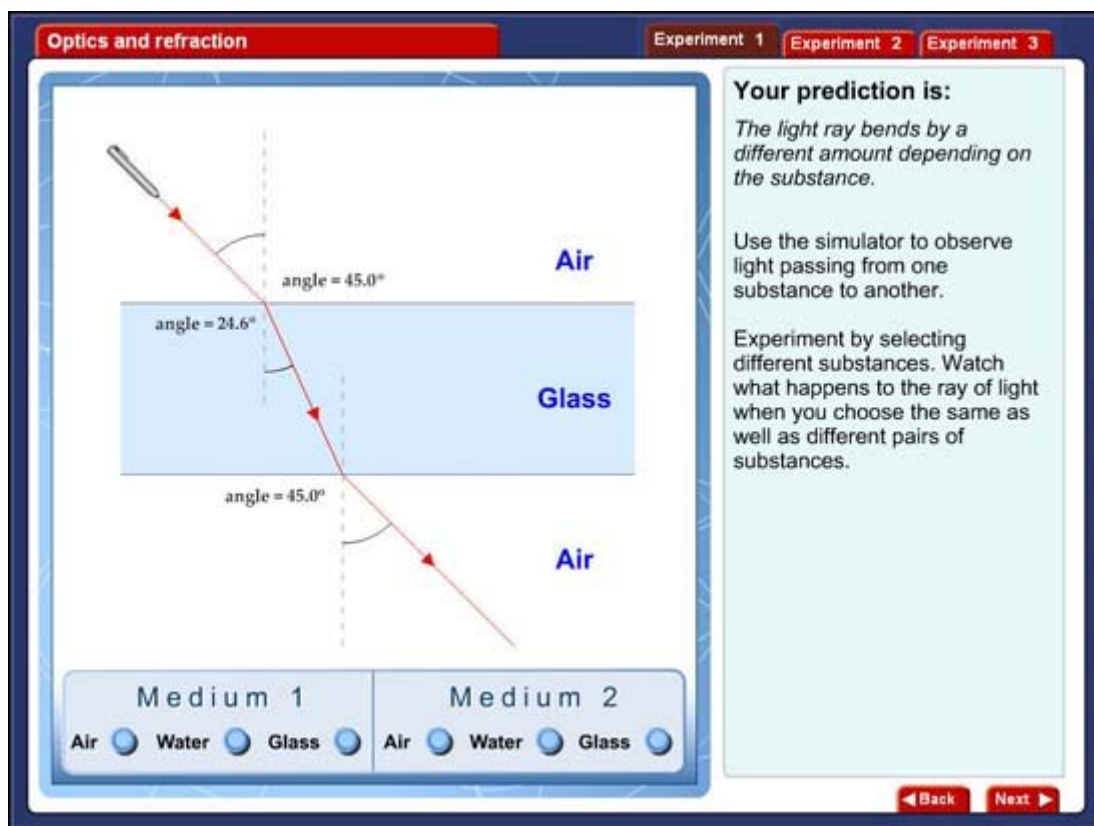
Students are able to experiment freely using a sophisticated sound simulation tool. They are able to change variables such as frequency, wavelength and amplitude, as well as varying speed and changing the medium the sound is travelling through. Once students have chosen their settings, they are able to test the results and see a representation of the sound in a traditional sine wave form, as well as in a particle representation.


Seeing with sound

This is an aggregated learning object combining the five other learning objects.

Optics and refraction (Years 9–10)

The Optics and refraction series enables students to manipulate light rays, noting the different ways the light rays travel through air, glass and water. Students choose between two hypotheses as they start each investigation. Simulations are accessible for further investigation after feedback has been given.



Learning objects	LO ID	Years
Optics and refraction: media density	1476	9–10
Optics and refraction: light angle	1477	9–10
Optics and refraction: focal point	1478	9–10
Optics and refraction 	1475	9–10

Optics and refraction: media density

Students interact with an animated model that shows how much a light ray bends as it passes from one substance to another. Students are able to select between air, gas and glass and see the angle of entry and exit from each of the selected substances.

Optics and refraction: light angle

Students are introduced to the concept of refraction and are able to interact with an animated model that changes the direction of a light ray as it passes through air and then glass. They are able to see that the ratio of the angles the light makes always stays the same, even if the direction of the light ray changes.

Optics and refraction: focal point

Students are introduced to the concept of focal length and are able to interact with an animated model that allows them to change both the thickness and the curvature of a lens. As a result of this interaction they are able to see that the distance from the lens to the point of focus, ie the focal length, is controlled by the thickness of the lens.

Optics and refraction

This is an aggregated learning object combining the three other learning objects.

Exploring atoms (Years 9–10)

The Exploring atoms series allows students to construct authentic atom and ion models of the first ten elements by assembling the required protons, neutrons and electrons

Exploring atoms

Atom and ion bingo

To start, move at least one particle to a target in the construction area. (Select it again if you want to remove it).

To check your atom or ion, select **Submit**.

Build an atom or ion from the symbol:

¹²₆C

Particles

Protons

p

p

p

p

Neutrons

n

n

n

n

n

Electrons

e

e

e

e

e


Construction area

Reset
Submit

Construction rules for atoms and ions

- Protons and neutrons go in the centre; electrons go in the shells.
- The number of neutrons equals the number of protons, plus possibly one or two more.
- For atoms: the number of electrons **equals** the number of protons.
- For ions: the number of electrons **does not equal** the number of protons.

Back to start
Back

Learning objects	LO ID	Years
Exploring atoms: assisted atom builder	2563	9–10
Exploring atoms: atom builder	2564	9–10
Exploring atoms: ion builder	2565	9–10
Exploring atoms: atom bingo	2566	9–10
Exploring atoms: atom and ion bingo	3124	9–10
Exploring atoms 	3125	9–10

Exploring atoms: assisted atom builder

Students explore sub-atomic particles and how they combine to form atoms. They do this by comparing different ways of modelling atoms and using nuclear symbols to represent different isotopes. Students also dynamically build atoms by combining protons, neutrons and electrons using an interactive tool. In this learning object the neutrons are added automatically.

Exploring atoms: atom builder

Students explore sub-atomic particles and how they combine to form atoms. They do this by comparing different ways of modelling atoms and using nuclear symbols to represent different isotopes. Students also build atoms by combining protons, neutrons and electrons using an on-screen tool.

Exploring atoms: ion builder

Students explore sub-atomic particles and how they combine to form atoms. They do this by comparing different ways of modelling atoms and ions and using nuclear symbols to represent different isotopes. Students also build atoms and ions by combining protons, neutrons and electrons using an on-screen tool.

Exploring atoms: atom bingo

Students explore sub-atomic particles and how they combine to form atoms. They do this by comparing different ways of modelling atoms and using nuclear symbols to represent different isotopes. Students then play bingo, where each player (up to two) has a bingo card of atoms to build by combining protons, neutrons and electrons using an on-screen tool.

Exploring atoms: atom and ion bingo

Students explore sub-atomic particles and how they combine to form atoms and ions. They do this by comparing different ways of modelling atoms and ions and using nuclear symbols to represent different isotopes. Students then play bingo, where each player (up to two) has a bingo card of atoms and ions to build by combining protons, neutrons and electrons using an on-screen tool

Exploring atoms

This is an aggregated learning object combining 'Exploring atoms: atom builder', 'Exploring atoms: ion builder' and 'Exploring atoms: atom and ion bingo'.

Resistors (Years 9–10)

The Resistors series introduces students to simple electronics.

Resistors
Ohm's Law Series and parallel Voltage divider **Light dimmer**

Light dimmer with transistor

Page 25 of 31

The light is on, but it's very dim.

Select **Switch 2** to move it to each position and look at the brightness of the light globe.

At each switch position, compare the current going to the base of the transistor and going to the collector.

Circuit symbols
Back Next

Learning objects	LO ID	Years
Resistors: Ohm's Law	3824	9–10
Resistors: series and parallel	3825	9–10
Resistors: voltage divider	3826	9–10
Resistors: light dimmer	3827	9–10
Resistors	3823	9–10

Beginning with Ohm's Law, students explore resistors in series and parallel before building a voltage divider and then a light dimmer. Simple circuit components are introduced, and students can view their work in either 'symbol' or 'component' view, allowing multiple representations of the same circuit. This is a low cost way to allow students to explore electronics.

Resistors: Ohm's Law

Students control the current in an electrical circuit by varying the voltage and resistance within the circuit. Various circuit components are introduced, such as meters, switches and batteries, which are all represented by circuit symbols. After measuring voltages and currents within the circuit students discover how they are related by Ohm's Law, and use this law to predict currents in further circuits.

Resistors: series and parallel

Within 'Resistors: series and parallel' it is possible to combine resistors in different ways to give new values of resistance, for example, connect them in series, or in parallel, or a mixture of both, and from there establish the rules for calculating the total resistance of the circuit. Finally, in problems of increasing difficulty, students must combine resistors to provide a specific resistance.

The learning object introduces resistors, power supplies, meters, switches and circuit symbols for each, with users able to switch the display from a 'real world' to a 'circuit symbol' view at will.

Resistors: voltage divider

Students use resistors to divide the voltage from a battery. By arranging resistors correctly they are able to obtain small voltages from larger ones. Students predict the voltage across any resistor in a circuit before measuring that voltage for resistors placed in series.

Through a series of structured tasks students develop Kirchoff's Voltage Law – the sum of the voltage drops in a circuit equals the voltage of the source. Students then solve a number of problems requiring resistors to be combined to achieve specified outcomes.

Resistors: light dimmer

Expands a simple voltage divider circuit, step-by-step, into a complex dimmer circuit containing a potentiometer and a transistor and including protection devices to prevent components from burning out, ultimately leading to the idea of a potentiometer as a continuously variable voltage divider.

This learning object introduces potentiometers, transistors and circuit symbols for each, while revisiting the rules for calculating the resistance of series and parallel combinations of resistors and the concept of a voltage divider.

Resistors

This is an aggregated learning object combining the four other learning objects in a sequence.

These learning objects were developed as part of the Intelligent Learning Objects project made possible through an Australian Research Council grant. Research, prototyping and production by The University of Melbourne's Victorian College of the Arts. Additional research by Queensland University of Technology's Education and Creative Industries faculties.

Logic gates (Years 9–10)

The Logic gates series introduces students to the concept of 'gates' and the way they can be used and combined in electronic control systems.

Logic gates Introduction Simple circuits Complex circuits

Auto on Manual on

Dam level

Solar cell

Rain sensor

Soil moisture sensor


Pump motor

Task 4 of 4

Complete this circuit to turn on the pump for a watering system from a dam. Watering should occur when the system is switched on manually or when it is set to automatic and all the following conditions are met:

- It is dark (solar cell is off).
- There is enough water in the dam (dam level switch is on).
- It is not raining (rain sensor is off).
- The soil is dry (soil moisture sensor is off).

NOT OR AND 3-input AND Submit

Learning objects	LO ID	Years
Logic gates: introduction	3829	9–10
Logic gates: simple circuits	3830	9–10
Logic gates: complex circuits	3837	9–10
Logic gates 	3828	9–10

Starting with each individual logic gate, students explore their operational parameters before solving 'real world' problems. The problems require the use of either a single logic gate or combinations of different gate types.

Logic gates: introduction

Initially students explore AND, OR and NOT gates to discover the way in which they function with truth tables automatically constructed to show the various results. From there students explore how different combinations of switches can give different outcomes to construct basic logic circuits to control a hedge trimmer, a hallway light, and a watering system.

Logic gates: simple circuits

Students build virtual circuits of increasing complexity using AND, OR and NOT logic gates singly in most instances and in combination to control different devices, including a street light, a burglar alarm and fire sprinkler systems.

Logic gates: complex circuits

Students build virtual circuits of increasing complexity using AND, OR and NOT logic gates in combination to monitor and control four complex systems.

Logic gates

This is an aggregated learning object combining the three other learning objects in a sequence.

These learning objects were developed as part of the Intelligent Learning Objects project made possible through an Australian Research Council grant. Research, prototyping and production by The University of Melbourne's Victorian College of the Arts. Additional research by Queensland University of Technology's Education and Creative Industries faculties.

Capacitors (Years 9–10)

In the Capacitors learning object students investigate the structure and function of capacitors and how they can be used to store electrical charge in simple circuits.

Capacitors
Light dimmer circuit with capacitor

The diagram shows a circuit with a 12V battery on the left. A vertical wire connects the positive terminal to a 'Voltage divider 1k' resistor. The other end of this resistor is connected to a horizontal wire. From this horizontal wire, the circuit goes down through a '47 k' resistor, then through a 'Switch (on)', then through another '47 k' resistor, and finally to a 'Light globe'. A 'Capacitor 1000 µF' is connected in parallel with the light globe. A voltmeter labeled 'Volts' is connected across the light globe, with a needle pointing to 12 on a scale from 0 to 12.

What do you think will happen if you vary the voltage with the capacitor turned on?

Experiment with the circuit, and then select **Next**.

Back
Next

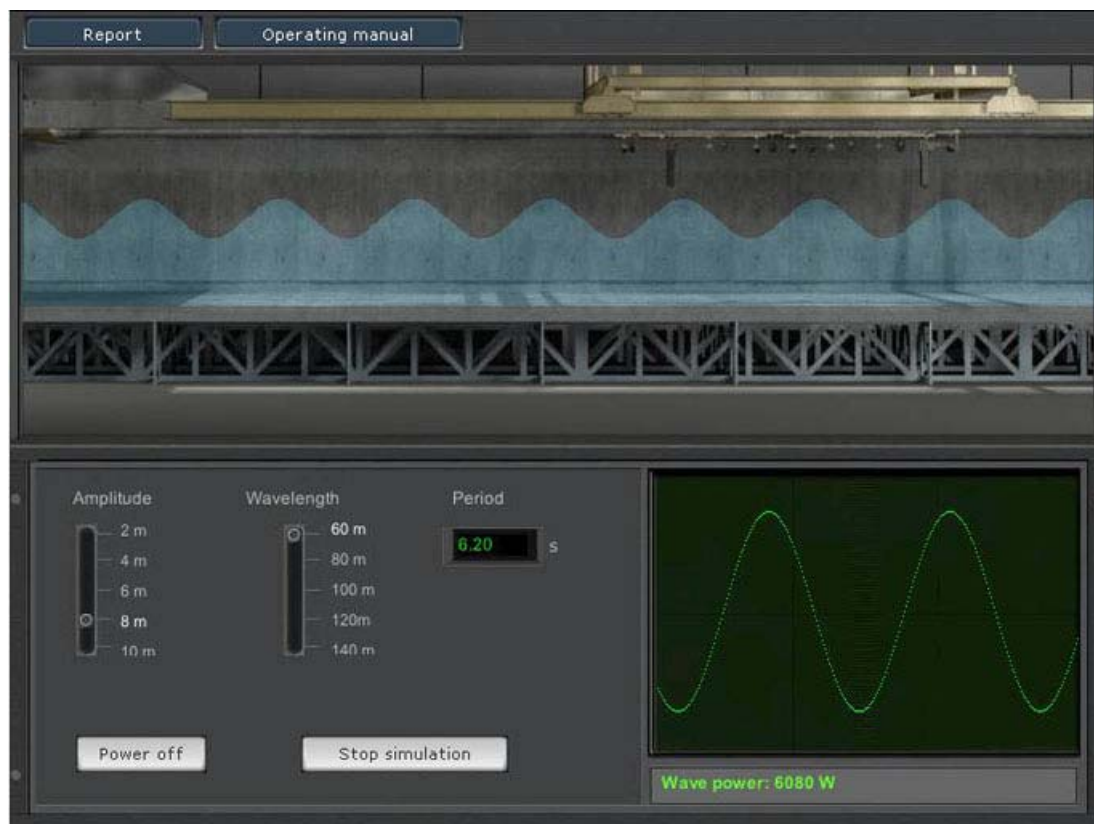
Learning objects	LO ID	Years
Capacitors	5928	9–10

The learning object enables students to operate and adjust circuits to investigate how capacitors store, charge and even out variations in current flow in electric circuits.

Students are introduced to the measurement of capacitance and multiple-choice questions test understanding of key concepts.

Wave Maker* (Years 9–10)

The Wave Maker series explores different aspects of waves, including their formation, the energy they carry with them, and their interaction with the coast.



Learning objects	LO ID	Years
Wave Maker: making waves	3820	9–10
*Wave Maker: wave energy	3821	9–10
*Wave Maker: breaking waves	3822	9–10
*Wave Maker: wave motion	4773	9–10
*Wave Maker: shallow water	4774	9–10

* Learning objects in development.

Wave Maker: making waves

This learning object allows students to simulate the formation of ocean waves by the wind to produce fully developed swell in a wave tank. They are able to experiment to find how the speed, duration and fetch of the wind affect the production of waves and the relationships between wind speed, amplitude and wave length of fully-developed swell before compiling a printable report of their findings.

Wave Maker: wave energy

Once waves have been generated in a wave tank, students measure the power carried by the waves and experiment to find how the power depends on the amplitude and wave length of the waves. A printable report of findings is generated.

Wave Maker: breaking waves

Once again students generate waves in a wave tank then investigate types of wave break and find the best conditions for creating surfing waves based on properties such as amplitude and slope of a beach. A printable report of findings is generated.

Wave Maker: wave motion

Using buoys floating at different depths, students discover how the water particles move and how deep the wave motion extends. A printable report of their findings is generated.

Wave Maker: shallow water

Simulated waves within a wave tank are used to investigate what happens when waves reach shallow water and to determine the depth of water when a wave breaks. A printable report of findings is generated.

These learning objects were developed as part of the Intelligent Learning Objects project made possible through an Australian Research Council grant. Research, prototyping and production by The University of Melbourne's Victorian College of the Arts. Additional research by Queensland University of Technology's Education and Creative Industries faculties.

Content from other sources

Electrifying concert (Years 5–8)

In the Electrifying concert series students set up wiring and stage lighting for a rock band. They complete electrical circuits, explore the effects of batteries and switches on current flows and assemble a spotlight to create a range of lighting effects.



Learning objects	LO ID	Years
Electrifying concert 🧩	3055	5–8
Electrifying concert: lighting	3056	5–8
Electrifying concert: wiring	3057	5–8

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Wiring (Years 5–12)

In the Wiring series students add components to complete various electrical circuits and relate circuit diagrams to actual circuits. They investigate current flow and see how circuits can be modelled by water flow.

Wiring The Simple Circuit

Click and drag a component into an empty slot to construct a simple circuit.

A symbolic diagram of an electric circuit allows accurate communication of its design. Each symbol represents a physical item to be used in the circuit

CHECK ANSWER

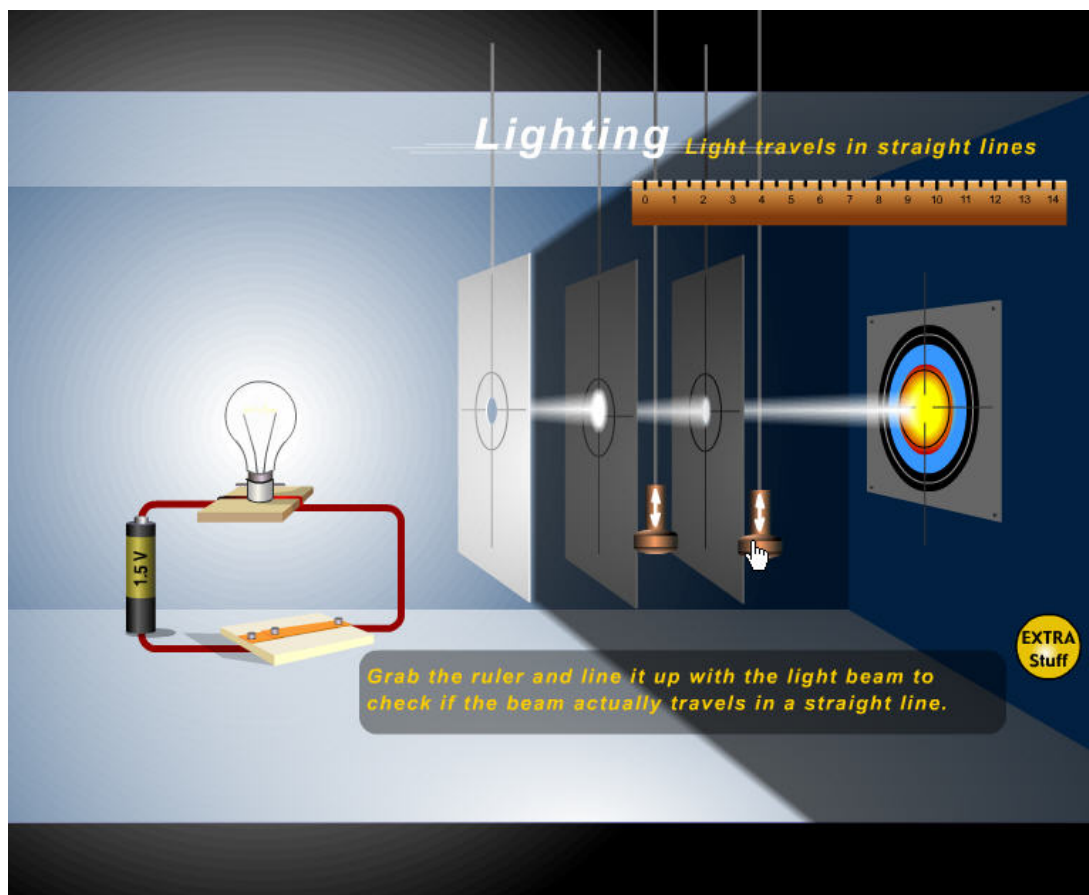
EXTRA Stuff

Learning objects	LO ID	Years
Wiring: the simple circuit	3058	5–8
Wiring: the series circuit	3059	5–8
Wiring: the parallel circuit	3060	5–8

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).

Lighting (Years 5–8)

In the Lighting series students use a model to verify that light rays travel in straight lines and explore the function of spotlight components, including reflectors, lenses and light filters.



Learning objects	LO ID	Years
Lighting: light travels in straight lines	3061	5–8
Lighting: assemble the spotlight	3062	5–8

These materials are licensed to Curriculum Corporation. Copyright is retained by State of Victoria (Department of Education & Training).



Working scientifically

The learning objects in the Working scientifically strand are designed to help students develop investigative and analytical skills to extend their understanding in Science, and to develop positive attitudes towards Science and the work of scientists.

Kitchen stacker (Years 1–3)

In the Kitchen stacker series students are introduced to the concept that common properties and attributes form the basis for classification systems.



Learning objects	LO ID	Years
Kitchen stacker: sort the groceries 1	2347	1–2
Kitchen stacker: sort the groceries 2	2348	1–2
Kitchen stacker: sort and label	2349	1–2
Kitchen stacker: label the cupboards	2350	2–3
Kitchen stacker: create your own	2351	2–3
Kitchen stacker 1 	2345	1–2
Kitchen stacker 2 	2346	2–3

In these learning objects students help Felix Fusspot, Tina Tidy and Polly Put-Away organise grocery items in kitchen cupboards according to common properties, for example size, colour or container type. They learn that items with more than one common property can be grouped in different ways.

Kitchen stacker: sort the groceries 1

Students drag and drop groceries into kitchen cupboards according to one common property such as size, colour or container type, for example as large, red or boxes. Labels on the cupboards provide written cues. Students then group the items according to two common properties.

Kitchen stacker: sort the groceries 2

Students drag and drop groceries into kitchen cupboards according to a common property such as size, colour or container type. This time there are no labels on the cupboards. They sort by matching to an initial visual cue. Students are then extended to group the objects according to two common properties.

Kitchen stacker: sort and label

Students sort items with two common properties into five cupboards. The learning object dynamically displays category labels that correspond to shared properties to assist the students.

Kitchen stacker: label the cupboards

Students sort items with three common properties into six cupboards. The learning object dynamically displays category labels that correspond to shared properties to assist the students.

Kitchen stacker: create your own

Students drag and drop groceries into six kitchen cupboards sorting them according to a common property of their own choosing. Students then label their cupboards and can print their work, which show the items in the labelled cupboards.

Kitchen stacker 1

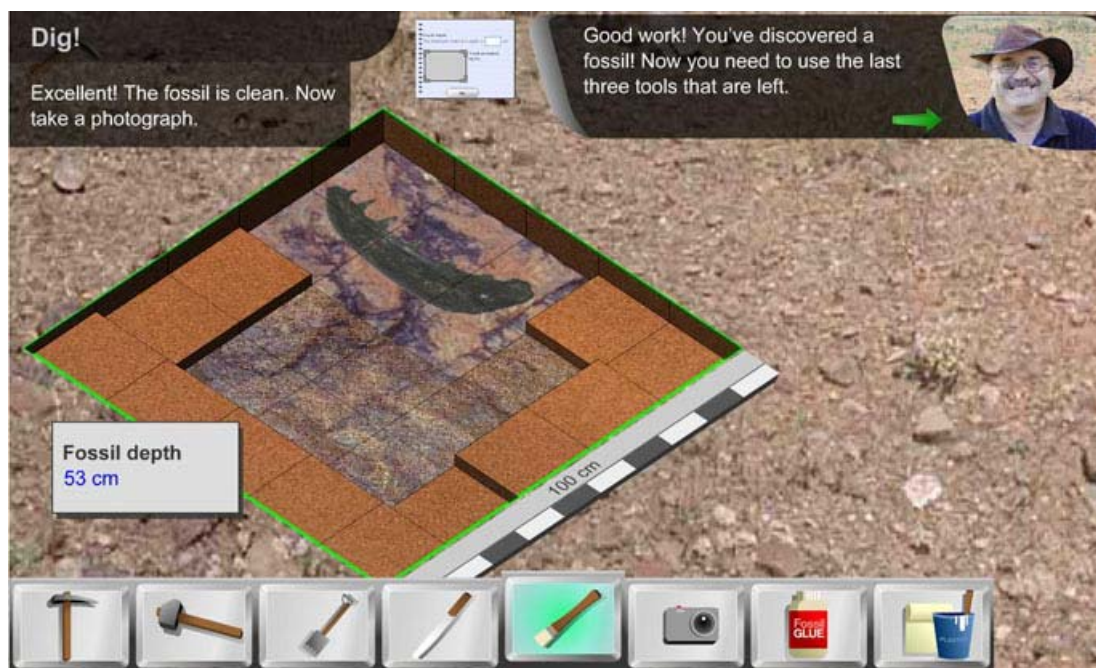
This is an aggregated learning object [with audio support] combining 'Kitchen stacker: sort the groceries 1', 'Kitchen stacker: sort the groceries 2' and 'Kitchen stacker: sort and label'.

Kitchen stacker 2

This is an aggregated learning object combining 'Kitchen stacker: sort the groceries 1', 'Kitchen stacker: sort the groceries 2', 'Kitchen stacker: label the cupboards' and 'Kitchen stacker: create your own'.

Colossal fossils* (Years 5–6)

In the Colossal fossils series, students take on the role of a palaeontologist. They excavate dig sites and prepare fossils for removal using appropriate archaeological tools. They use dating techniques to determine the age of the fossils, and then finally identify the creature.



Learning objects	LO ID	Years
Colossal fossils: the dig	2011	5–8
Colossal fossils: jaw analysis	2013	5–8

In these learning objects, students join a team of palaeontologists working on an Australian megafauna dig site. The palaeontologists are seeking seven types of extinct Australian megafauna fossils, including *Kolopsis torus*, *Zygomaturus trilobus* and *Diprotodon gollah*. The learning objects include an interactive notebook for students to record their observations. The series supports repeated use by randomly generating a fossil to recover and identify, and provide a printable species description of the extinct animal.

Colossal fossils: the dig

Using appropriate archaeological tools, such as a pick, rock hammer and scraping knife, students dig up and describe a megafauna jaw bone or skull. They prepare the specimen for removal using different tools, such as a fine brush, glue and plaster, before the mentor palaeontologist identifies the fossil.

Colossal fossils: jaw analysis

Students undertake a series of analysis tasks to determine to which megafauna species a fossilised jaw bone belongs. They take jaw measurements, analyse the dentition of the jaw, and compare this data to related data in a megafauna database. Background information on different types of dentition is provided.

* Further learning objects in this series are in development.

Fair test (Years 5–8)

The Fair test series enables students to conduct experiments in a plant research laboratory to investigate the effects of different variables on the growth of different vegetables.



Learning objects	LO ID	Years
Fair test: growing tomatoes	1184	5–8
Fair test: growing peas	1185	5–8
Fair test: growing lettuce	1186	5–8
Fair test 🧪🌱	540	5–8

Students run experiments in a plant research laboratory to investigate the effects of different variables on the growth of lettuces, peas and tomatoes by conducting 'fair tests'. Motivation is provided through emails to the student, who then must research the answer to questions asked in the emails about how to achieve optimum hydroponic growth conditions. To respond to these emails they need to examine the effect of key variables on growth: nitrogen, temperature, light intensity and light duration.

Fair test: growing tomatoes

Students are asked to determine the finalised seed packet information for tomato seeds by the 'marketing department'. They must determine the values to be printed on the packet for optimum nitrogen level, temperature, light intensity and light duration by conducting a range of 'fair tests' in the plant research laboratory.

Fair test: growing peas

'Fair test: growing peas' uses the same task, laboratory and motivation as 'Fair test: growing tomatoes', however focuses on pea plants.

Fair test: growing lettuce

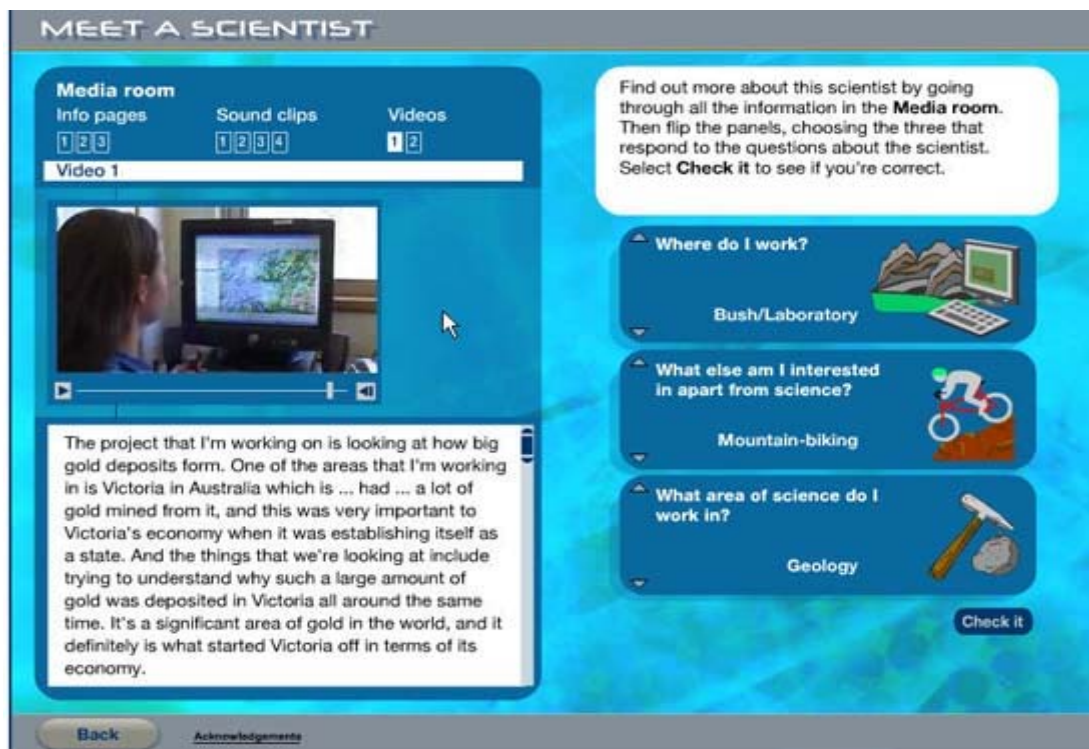
'Fair test: growing lettuce' uses the same task, laboratory and motivation as 'Fair test: growing tomatoes', however focuses on lettuce plants.

Fair test

This is an aggregated learning object combining the three other learning objects.

Meet a scientist (Years 5–9)

The Meet a scientist series provides opportunities for students to develop a broad understanding of the science profession and of scientists as people.



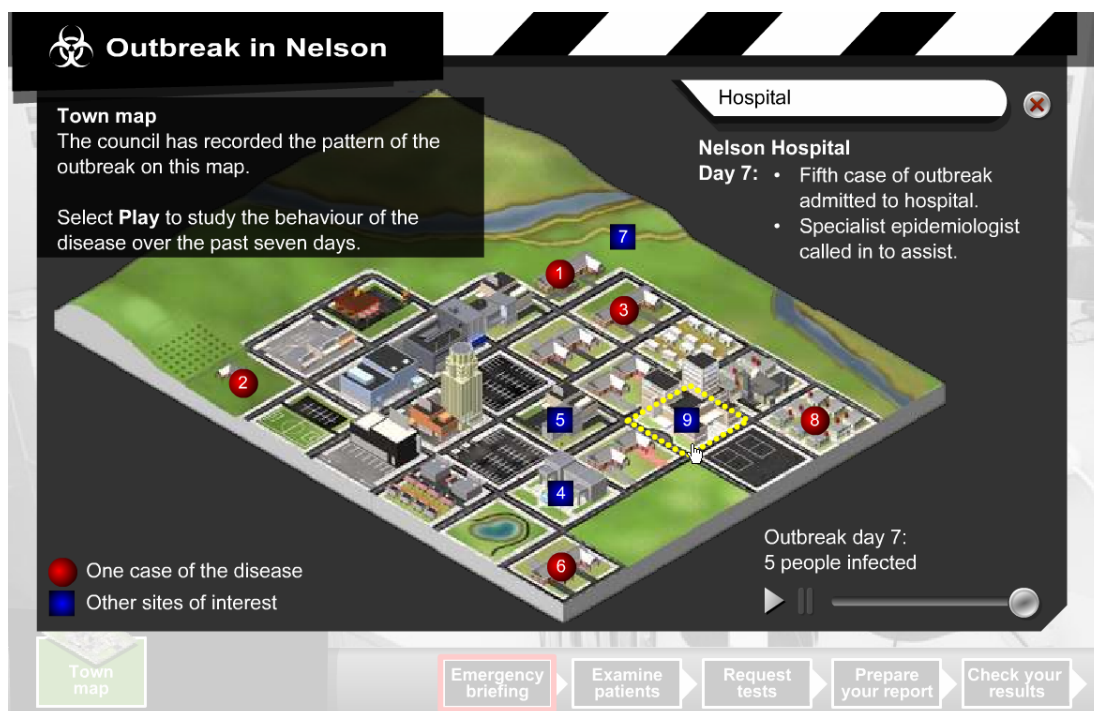
Learning objects	LO ID	Years
Meet a scientist: geologist and environmental scientist	499	5–8
Meet a scientist: geologist and environmental scientist [no spoken instructions]	500	5–8
Meet a scientist: geologist	501	5–8
Meet a scientist: geologist [no spoken instructions]	502	5–8
Meet a scientist: environmental scientist	503	5–8
Meet a scientist: environmental scientist [no spoken instructions]	504	5–8
Meet a scientist: virologist	505	5–8
Meet a scientist: virologist [no spoken instructions]	506	5–8
Meet a scientist: electronics engineer	507	5–8
Meet a scientist: electronics engineer [no spoken instructions]	508	5–8
Meet a scientist: venom researcher	509	5–8
Meet a scientist: venom researcher [no spoken instructions]	510	5–8
Meet a scientist: materials researcher	511	5–8
Meet a scientist: materials researcher [no spoken instructions]	512	5–8
Meet a scientist: materials researcher and venom researcher	636	5–8
Meet a scientist: materials researcher and venom researcher [no spoken instructions]	637	5–8
Meet a scientist: virologist and electronics engineer	634	5–8
Meet a scientist: virologist and electronics engineer [no spoken instructions]	635	5–8
Meet a scientist: nanotechnology: microbiologist	2546	7–9
Meet a scientist: nanotechnology : program manager	2547	7–9
Meet a scientist: nanotechnology : project manager	2548	7–9

'Meet a scientist: materials researcher and venom researcher' contains non-TLF content. See Acknowledgements in the learning objects.

By exploring a range of information about the life and work of specific scientists, students can recognise the diverse nature of scientific activity and that scientists are often engaged in interesting and challenging work that is valuable to our society.

Mystery disease* (Years 9–10)

In this series of learning objects, students act as an expert epidemiologist brought in to investigate the outbreak of a contagious disease in a town.



Learning objects	LO ID	Years
*Mystery disease: outbreak in Johnsonville	2015	9–10
Mystery disease: outbreak in Glenbrook	2016	9–10
Mystery disease: outbreak in Stratton	2017	9–10
*Mystery disease: outbreak in Waverly	2018	9–10
*Mystery disease: outbreak in McArthur Vale	2019	9–10
Mystery disease: outbreak in Nelson	5316	9–10

* Learning objects in development.

In each object in the series, students investigate the spread of a disease in a fictitious town and decide which disease is responsible for the illness.

Students undertake a number of tasks to assist them in making their diagnosis, including; examining patients; matching patient symptoms to diseases in a medical manual; determining which medical tests are needed to confirm the diagnosis.

Once the specific disease has been isolated students must identify how the disease is spread, places where the disease-causing microorganisms may be found and suggest control measures such as quarantine or vaccination.

Finally students are provided with the results of pathology tests to confirm their diagnosis, plus feedback on the effectiveness of control measures they have recommended.

In each of the six objects a different disease is responsible for the illness. The diseases are: Avian flu, Cryptosporidiosis, Hepatitis A, Meningococcal disease, Ross River virus disease, and Whooping Cough.

* Further learning objects in this series are in development.

Science reporter (Years 7–10)

The Science reporter series provides opportunities for students to develop a broad understanding of the science profession and scientists as people.



Learning objects	LO ID	Years
Science reporter: geologist and environmental scientist	513	7–10
Science reporter: geologist and environmental scientist [no spoken instructions]	514	7–10
Science reporter: geologist	515	7–10
Science reporter: geologist [no spoken instructions]	516	7–10
Science reporter: environmental scientist	517	7–10
Science reporter: environmental scientist [no spoken instructions]	518	7–10
Science reporter: virologist	519	7–10
Science reporter: virologist [no spoken instructions]	520	7–10
Science reporter: electronics engineer	521	7–10
Science reporter: electronics engineer [no spoken instructions]	522	7–10
Science reporter: venom researcher	523	7–10
Science reporter: venom researcher [no spoken instructions]	524	7–10
Science reporter: materials researcher	525	7–10
Science reporter: materials researcher [no spoken instructions]	526	7–10
Science reporter: venom researcher and materials researcher	640	7–10
Science reporter: venom researcher and materials researcher [no spoken instructions]	641	7–10
Science reporter: virologist and electronics engineer	638	7–10
Science reporter: virologist and electronics engineer [no spoken instructions]	639	7–10
Science reporter: nanotechnologist	2549	7–10

Students explore the lives and interests of scientists and their scientific activities. Taking the role of a science reporter on a virtual online newspaper, students investigate text, images, sound clips and videos about each scientist, then compile their report using a digital report maker. Students can output their report to view on screen or print out.

Exploring atoms: atom structure (Years 9–10)

In this learning object students are exposed to the original Rutherford experiments and their importance in the development of atomic theory. From a range of alternatives, students also choose the best atom model to explain the results of a particle experiment.





Exploring atoms
Atom structure

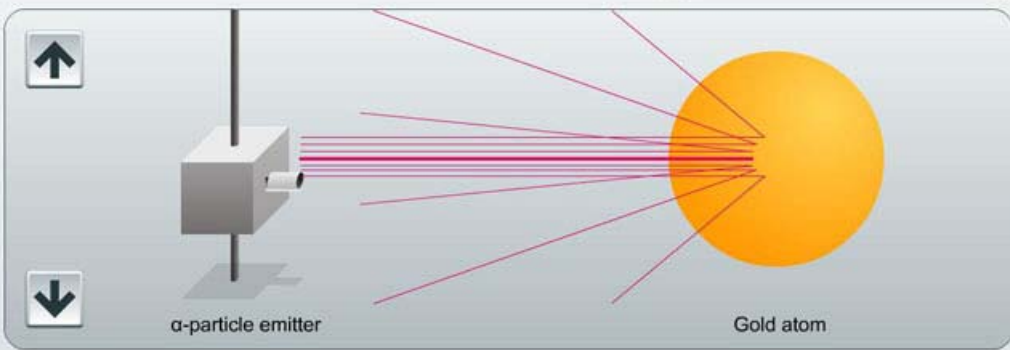
Find the structure of the atom

Now try the experiment to see which model seems to fit this atom.

- Select the α -particle emitter to fire positive particles at the gold atom.
- Move it up and down to shoot particles through many different parts of the atom.
- When you are ready to choose a model, select **Next**.

Atom models

 Solid sphere	 Plum pudding
 Small nucleus	 Large nucleus



α -particle emitter

Gold atom

Back

Next

Learning objects	LO ID	Years
Exploring atoms: atom structure	2562	9–10

'Exploring atoms: atom structure' contains non-TLF content. See Acknowledgements in the learning object.

Content from other sources

Forensic science (Years 9–12)

Students explore how various samples are collected, organised and analysed for scientific analysis. They compare a range of samples and observe differences.

Collecting samples
[Back](#)

Quicktime movie of a scientist collecting a DNA swab from a cup



One of the surprising things about DNA is just how little is required.

In this case the criminal is thought to have picked up the cup. Tiny skin flakes and other body residues are transferred from fingers onto the cup handle, just as described in the fingerprints section.

Lightly swabbing the handle with a cotton bud will collect enough body material to allow an effective analysis.



©The Crown in Right of Tasmania [Conditions of use](#) (This item contains non-TLF content.)

Learning objects	LO ID	Years
Forensic science: DNA	1462	9–12
Forensic science: blood	1463	9–12
Forensic science: fibres and hairs	1464	9–12
Forensic science: fingerprints	1465	9–12
Forensic science: footprints	1466	9–12
Forensic science: handwriting	1467	9–12
Forensic science: identikit	1468	9–12
Forensic science: building a profile	1469	9–12

These materials are licensed to Curriculum Corporation. Copyright is retained by the Crown in Right of Tasmania.